ThinkServer TS100 Types 6431, 6432, 6433, 6434

lenovo

Installation Guide

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Note:

Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 81, and the *Warranty and Support Information* document on the *ThinkServer Documentation* DVD.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安裝本产品之前，请仔细阅读 Safety Information
(安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled "Statement 1," translations for that caution statement are in the *Safety Information* document under "Statement 1."

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

Statement 1:

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:
- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 2:

CAUTION:
When replacing the lithium battery, use only the battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:
- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Statement 3:

CAUTION:

When laser products (such as CD drives, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**

- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 4:
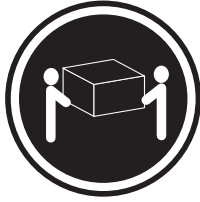
≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)
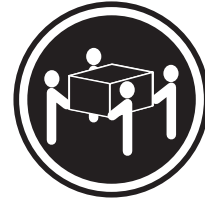
CAUTION:
Use safe practices when lifting.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

2

1
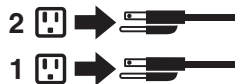
Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 12:

CAUTION:
The following label indicates a hot surface nearby.

Statement 13:

DANGER

> Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.

Statement 15:

CAUTION:
Make sure that the rack is secured properly to avoid tipping when the server unit is extended.

Chapter 1. Introduction

This *Installation Guide* contains instructions for setting up the Lenovo®
ThinkServer™ TS100 Machine Types 6431, 6432, 6433, 6434 server and basic
instructions for installing some optional devices. More detailed instructions for
installing optional devices are in the *User Guide* on the *ThinkServer Documentation*
DVD, which comes with the server. This document contains information about:

- Setting up and cabling the server
- Starting and configuring the server
- Installing some optional devices
- Solving problems

If firmware and documentation updates are available, you can download them
from the Lenovo Web site. The server might have features that are not described in
the documentation that comes with the server, and the documentation might be
updated occasionally to include information about those features, or technical
updates might be available to provide additional information that is not included
in the server documentation. To check for updates, complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. Procedures for
locating firmware and documentation might vary slightly from what is
described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select
   Servers and Storage from the **Select your product** list.
3. Select **Servers and Storage** from the **Brand** list.
4. From **Family** list, select **ThinkServer TS100**, and click **Continue**.
5. Click **Downloads and drivers** for firmware updates, or click **User's guides and
   manuals** for documentation updates.

The server comes with a *ThinkServer EasyStartup* DVD to help you configure the
hardware, install device drivers, and install supported operating systems.

The server comes with a limited warranty. For information about the terms of the
warranty and getting service and assistance, see the *Warranty and Support
Information* document.

You can obtain up-to-date information about the server and other Lenovo® server
products at: http://www.lenovo.com/thinkserver.

Record information about the server in the following table. You will need this
information when you register the server with Lenovo.

Product name	ThinkServer TS100
Machine type	6431, 6432, 6433, 6434
Model number	_____
Serial number	_____
Key serial number	_____
Key manufacturer	_____

Key phone number	_____

The model number and serial number **1** are on the lower-right side of the bezel, as shown in the following illustrations. This illustration might differ slightly from your hardware.

Note: This illustration shows a hot-swap model. A non-hot-swap hard disk drive model is also available.
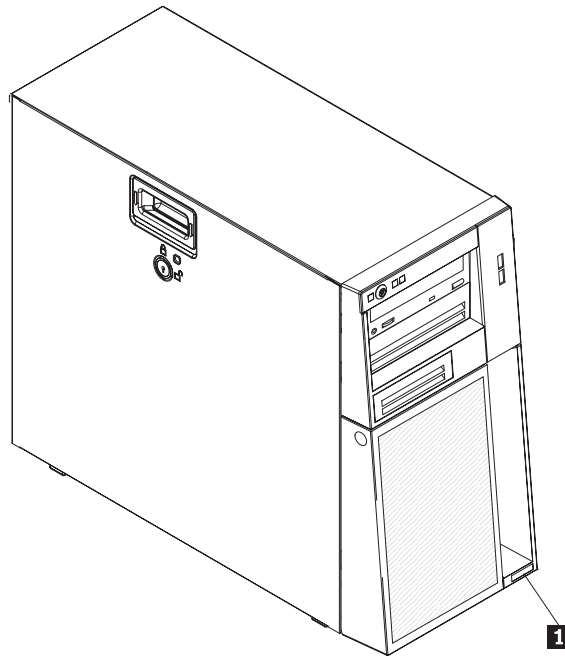
Important: The server keys cannot be duplicated by a locksmith. If you lose them, order replacement keys from the key manufacturer. The key serial number and the telephone number of the manufacturer are on a tag that is attached to the keys.

If you plan to install the server in a rack, you must purchase a Tower-to-Rack Kit. For a list of supported optional devices for the server, see http://www.lenovo.com/accessories.

Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the *ThinkServer Documentation* DVD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Major components of the server

Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.

Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

The following illustration shows the major components in the server.

Note: The illustrations in this document might differ slightly from your hardware.
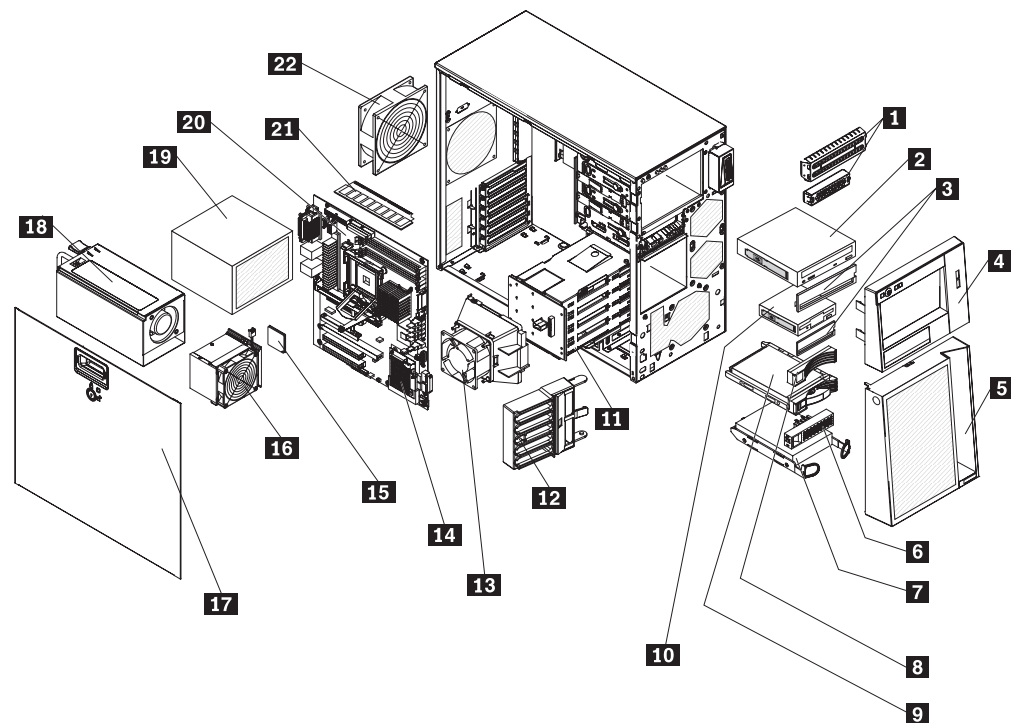
1	EMC shields	**12**	Front adapter- support bracket
2	Optical drive	**13**	Hard disk drive fan assembly
3	Filler panels	**14**	SAS/SATA controller
4	Upper bezel	**15**	Microprocessor
5	Lower bezel	**16**	Heat sink
6	SATA filler panel	**17**	Cover
7	SATA hard disk drive (some models)	**18**	Hot-swap power supply
8	SAS filler panel	**19**	Non-hot-swap power supply
9	Hot-swap hard disk drive (some models)	**20**	System board
10	Diskette drive (optional)	**21**	DIMM
11	Drive cage	**22**	Rear system fan

Chapter 2. Installing optional devices

This chapter provides basic instructions for installing optional hardware devices in the server. These instructions are intended for users who are experienced with setting up Lenovo server hardware. If you need more detailed instructions, see the *User Guide* on the *ThinkServer Documentation* DVD.

Installation guidelines

Before you install optional devices, read the following information:

- Read the safety information that begins on page v, the guidelines in "Working inside the server with the power on" on page 8, and "Handling static-sensitive devices" on page 9. This information will help you work safely.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, complete the following steps.

  Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

  1. Go to: http://www.lenovo.com/support.
  2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
  3. Select **Servers and Storage** from the **Brand** list.
  4. From **Family** list, select **ThinkServer TS100**, and click **Continue**.
  5. Click **Downloads and drivers** to download firmware updates.

- Before you install optional hardware devices, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see Solving problems for diagnostic information.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- If you must start the server while the cover is removed, make sure that no one is near the server and that no tools or other objects have been left inside the server.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  - Make sure that you can stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.

- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not have to turn off the server to install or replace hot-swap power supplies or hot-plug Universal Serial Bus (USB) devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing and installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you have to access the inside of the server, you might find it easier to lay the server on its side.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported optional devices for the server, see http://www.lenovo.com/accessories.

System reliability guidelines

To help ensure proper system cooling and system reliability, make sure that the following requirements are met:
- If the server has redundant power, each of the power-supply bays has a power supply installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before you turn on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.

  When you install the server in a rack, make sure that space is available around the server to enable the server cooling system to work properly. See the documentation that comes with the rack for additional information.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of removal.

Working inside the server with the power on

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

Some models of the server supports hot-plug, hot-add, and hot-swap devices and is designed to operate safely while it is turned on and the cover is removed. Follow these guidelines when you work inside a server that is turned on.

- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before you work inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie or scarf to hang inside the server.
- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that might fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

Attention: Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available. Always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Removing the side cover

Important: Before you install optional hardware devices, make sure that the server is working correctly. Start the sever, and make sure that the operating system starts, if and operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see Solving problems for diagnostic information.

To remove the server side cover, complete the following steps:

1. Review the safety information that begins on page v and the "Installation guidelines" on page 7.
2. Turn off the server and all attached devices (see "Turning off the server" on page 38); then, disconnect all power cords and external cables.
3. Lay the server on its side.
4. Unlock the side cover; then, press the cover-release latch down, as indicated by the two arrows on the latch.
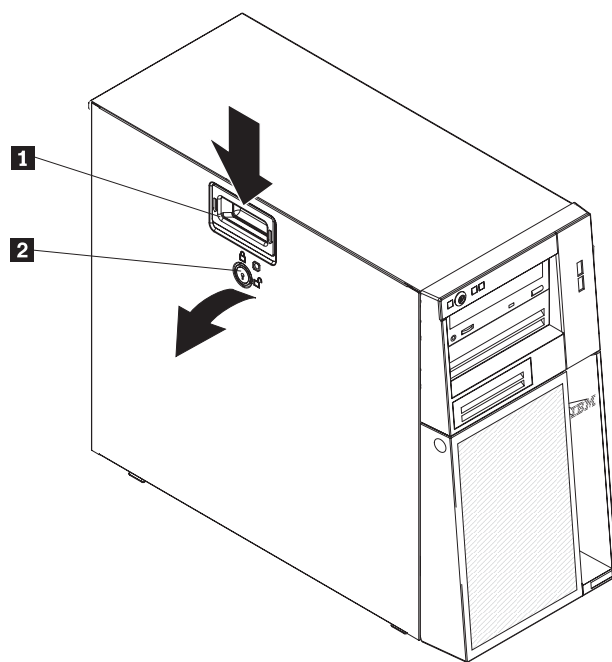
1 Cover-release latch Optical drive
2 Key lock

5. Lift the side cover off the server and set it aside.

To replace the side cover, see "Reinstalling the side cover" on page 32.

Attention: For proper cooling and airflow, replace the cover before you turn on the server. Operating the server for extended periods of time (more than 30 minutes) with the cover removed might damage server components.

Removing the two-piece bezel

When you work with some devices, such as drives in bays 1 through 7 (or bays 1 through 11 if you have the 2.5-inch eight-drive model, see page Table 5 on page 17), you must first remove the two-piece bezel to access the devices.

Notes:

- Before you remove the upper bezel, you must unlock and remove the side cover and remove the lower bezel.
- If you are removing only the lower bezel, you do not have to remove the side cover. However, the side cover must be unlocked.

To remove the two-piece bezel, complete the following steps:

1. Unlock the side cover.
2. Remove the side cover (see "Removing the side cover" on page 10).
3. Press the round blue release button on the right side of the lower bezel and tilt the lower bezel forward to disengage it from the chassis.
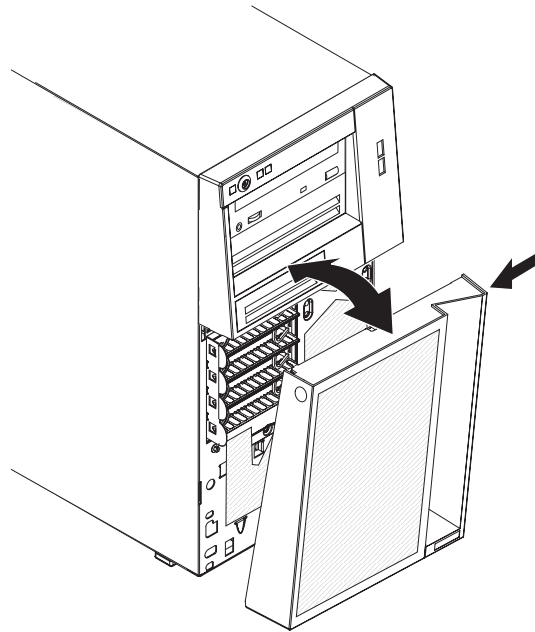
4. Lift the lower bezel to disengage the two bottom tabs from the chassis. Set the lower bezel aside.

5. Carefully pull the two bezel clips **1** on the left side of the upper bezel away from the chassis; then, rotate the upper bezel to the right side of the server to disengage the two right-side tabs from the chassis. Set the upper bezel aside.
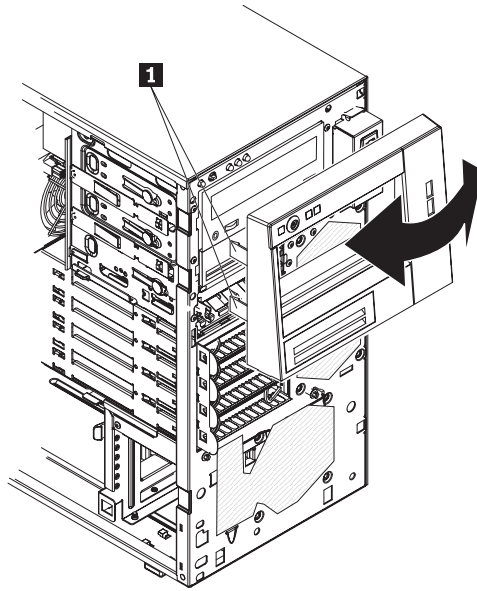
For instructions for reinstalling the two-piece bezel, see "Reinstalling the two-piece bezel" on page 30.

Installing a memory module

The following notes describe the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when you install DIMMs:

- The server supports only industry-standard, 1.8 V, 240-pin, double-data-rate 2 (DDR2), 800 MHz, PC2-5300 or PC2-6400, unbuffered, synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs) with error correcting code (ECC). These DIMMs must be compatible with the latest DDR2 800 MHz SDRAM unbuffered DIMM specification. For a list of supported optional devices for the server, see http://www.lenovo.com/accessories.
- The optional DIMM that are available for the server are 1 GB and 2 GB. The server supports a minimum of 1 GB and a maximum of 8 GB of system memory.
- Some servers come with two 1-GB DIMMs installed.

  Depending on the DIMM sizes installed in your server, the server can support two or four DIMMs. The 1-GB DIMM and 2-GB option kits each contain two DIMMs.
- The system board contains four DIMM connectors and supports two-way memory interleaving. For two-way memory interleaving, DIMMs must be installed in matched pairs.

  If one DIMM is installed in the DIMM 1 connector, when you install an additional DIMM, it must be installed in the DIMM 3 connector, and it must be the same size, speed, type, and technology as the DIMM in the DIMM 1 connector. You can use compatible DIMMs from various manufacturers.

  If you install a second pair of DIMMs in the DIMM 2 and DIMM 4 connectors, they do not have to be the same size, speed, type, and technology as the DIMMs in the DIMM 1 and DIMM 3 connectors. However, the size, speed, type, and technology of the DIMMs that you install in the DIMM 2 and DIMM 4 connectors must match each other.
- The maximum operating speed of the server is determined by the slowest DIMM in the server.
- The server can operate in single-channel mode or dual-channel mode.
- DIMM population is based on single-rank, double-rank, or combined single-rank and double-rank DIMMs. DIMMs must be installed in order, starting with the DIMM connector that is farthest from the memory controller hub. Double-rank DIMMs must be installed in the DIMM connector that is farthest from the memory controller hub when you install a combination of single-rank and double-rank DIMMs. The following tables show examples of populating the server with different combinations of single-rank and double-rank DIMMs and different operating modes.

Table 1. Single-channel mode with single-rank and double-rank DIMMs

Channel 0		Channel 1	
DIMM 1	DIMM 2	DIMM 3	DIMM 4
Single-rank			
Double-rank			
Single-rank	Single-rank		

Table 2. Dual-channel mode with single-rank and double-rank DIMMs

First pair		Second pair		Remarks
DIMM 1	DIMM 2	DIMM 3	DIMM 4	

Table 2. Dual-channel mode with single-rank and double-rank DIMMs (continued)

First pair		Second pair		Remarks
Single-rank	Single-rank	Single-rank	Single-rank	
Single-rank	Single-rank	Double-rank	Double-rank	This configuration is the second-best choice.
Double-rank	Double-rank	Single-rank	Single-rank	This configuration is the best choice.
Double-rank	Double-rank	Double-rank	Double-rank	

The following table shows the sequence in which DIMMs must be installed in the server.

Table 3. DIMM installation sequence

Number of DIMMs	Installation sequence (connectors)
1	1
2 (interleaved configuration)	1, 3
3	The use of three DIMMs is not supported
4 (interleaved configuration)	1, 3, 2, 4

- The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. To view the total amount of installed memory and the amount of configured memory, run the Configuration/Setup Utility program and select **System Summary** from the menu. For additional information, see the *User Guide* on the *ThinkServer Documentation* DVD.
- When you restart the server after you add or remove a DIMM, the server displays a message that the memory configuration has changed.

The following illustration shows the dual inline memory module (DIMM) ▇2 connectors and corresponding LEDs ▇1 on the system board.
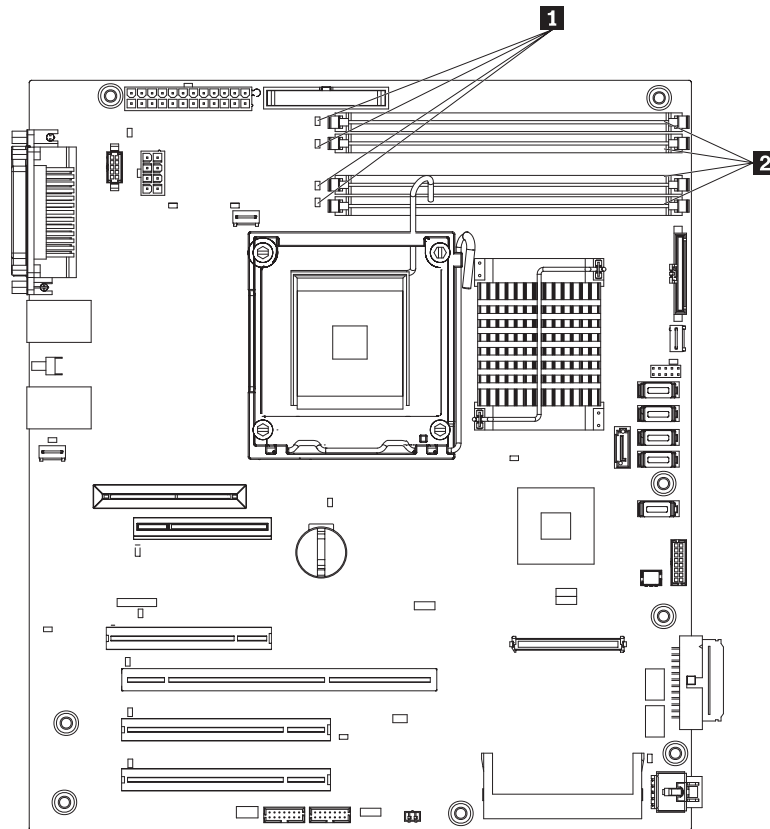
Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

To install a DIMM, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 7.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the side cover (see "Removing the side cover" on page 10).
4. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. Install the DIMMs in the sequence shown in the following table.

Table 4. DIMM installation sequence

Number of DIMMs	Installation sequence (connectors)
1	1
2 (interleaved configuration)	1, 3
3	The use of three DIMMs is not supported
4 (interleaved configuration)	1, 3, 2, 4

Attention: To avoid breaking the retaining clips **2** or damaging the DIMM connectors, open and close the clips gently.

5. Open the retaining clips and, if necessary, remove any existing DIMM **1**.
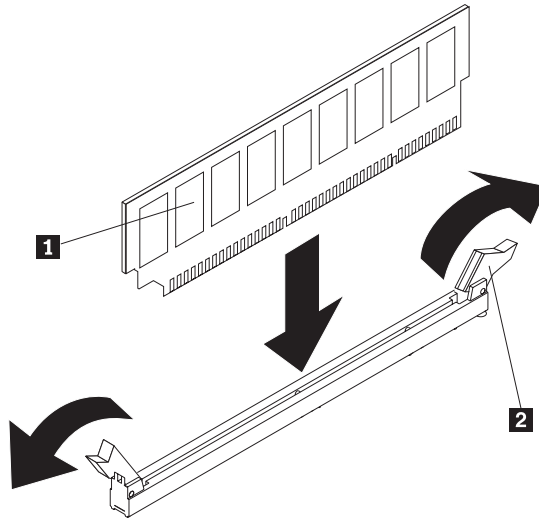
6. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server. Then, remove the new DIMM from the package.
7. Turn the DIMM so that the DIMM keys align correctly with the slot.
8. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, and then reinsert it.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 30.

Installing a drive

Depending on the server model, a DVD-ROM or multiburner drive might be installed in the server. The server supports 2.5-inch and 3.5-inch hot-swap SAS or hot-swap SATA hard disk drives and 3.5-inch simple-swap SATA hard disk drives (depending on the model).

The following illustrations show the locations of the drive bays. Some models have seven drive bays **1** to **7** , and some models have eleven drive bays **1** to **11** .

Table 5. Drive bays on the server models

Seven drive-bay model	Eleven drive-bay model
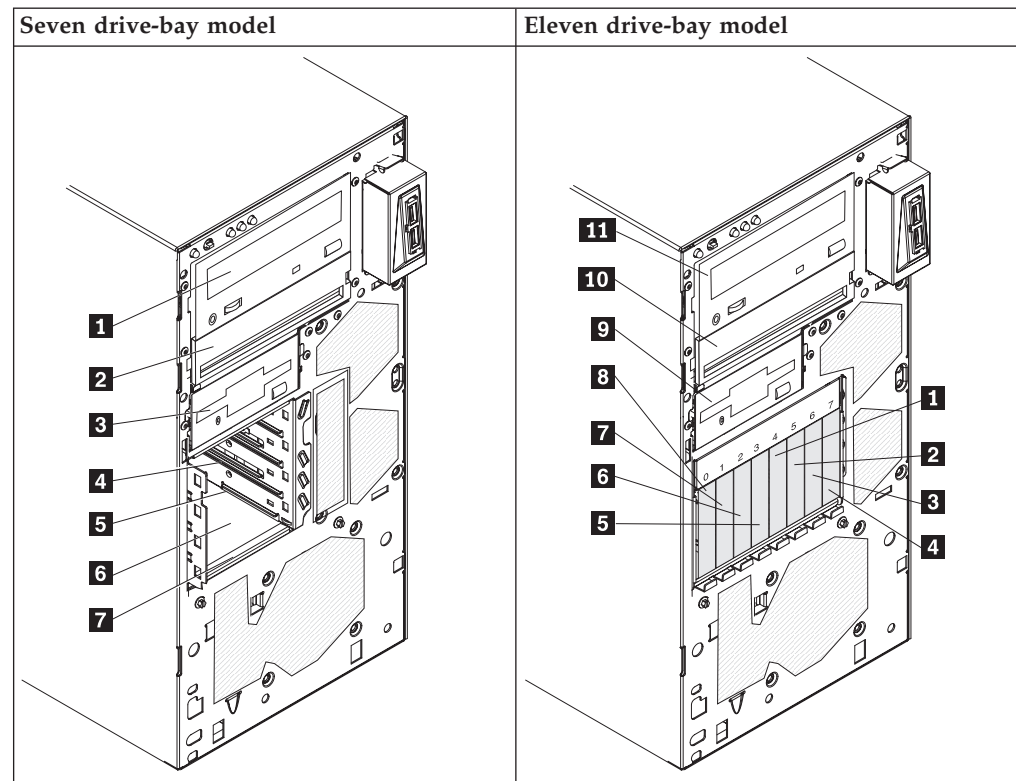
The following notes describe the types of drives that the server supports and other information that you must consider when you install a drive:

- Make sure that you have all the cables and other equipment specified that are in the documentation that comes with the drive.
- Select the bay in which you want to install the drive.
- Check the instructions that come with the drive to determine whether you have to set any switches or jumpers on the drive. If you are installing a SAS or SATA device, be sure to set the SAS or SATA ID for that device.
- Optional internal or external USB diskette drives, tape drives, DVD-ROM, and multiburner drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, and 3 only.
- The SATA removable-media drives that you install in bay 1 connects to the SATA 4 connector on the system board and the drive in bay 2 connects to the SATA 5 connector on the system board.
- To install a 3.5-inch drive in a 5.25-inch bay, you must use the 5.25-inch conversion kit.

- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays, and PCI and PCI Express slots covered or occupied. When you install a drive, PCI, or PCI Express adapter, save the EMC shield and filler panel from the bay or the PCI or PCI Express adapter slot cover in the event that you later remove the device.
- For a list of supported optional devices for the server, go to: http://www.lenovo.com/accessories/.

Installing a CD or DVD drive

To install a CD or DVD drive, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 7.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the side cover (see "Removing the side cover" on page 10).
4. Remove the two-piece bezel (see "Removing the two-piece bezel" on page 11).
5. Use a screwdriver to pry the filler panel and EMC shield away from the server.

   Note: If you are installing a drive that contains a laser, observe the following safety precaution.

   Statement 3:

   CAUTION:
   When laser products (such as CD drives, DVD drives, fiber optic devices, or transmitters) are installed, note the following:
   - **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
   - **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

> **Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.**
>
> **Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.**

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

6. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.

7. Set any jumpers or switches on the drive according to the documentation that comes with the drive.

   Note: You might find it easier to install the new drive from the front and then attach the cables.

8. Remove the drive retainer clip from the side of the drive cage of bays 1 or 2. Slide the drive retainer clip to the right to remove it from the drive cage; then, snap the drive retainer clip into the screw holes on the side of the drive.
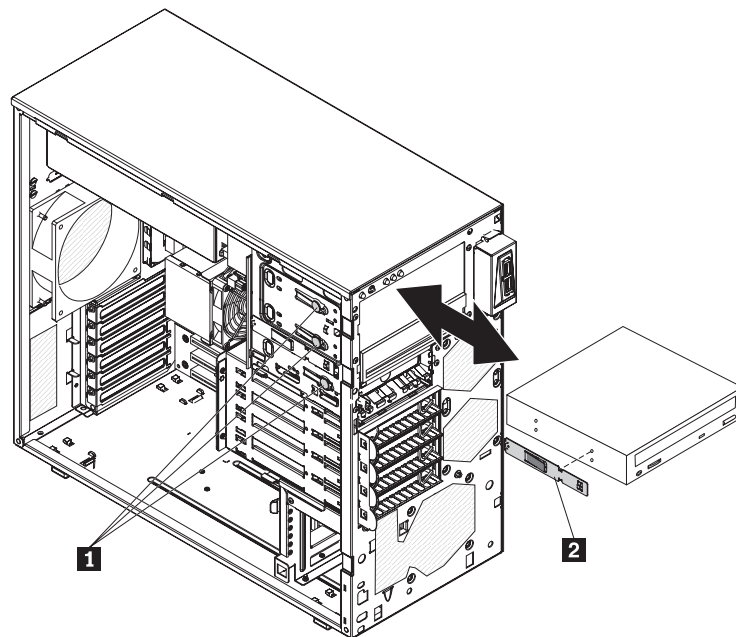
1 Release buttons
2 Drive retainer clip

9. If you are installing a 5.25-inch drive in bay 2, slide the drive into the bay. If you are installing a 3.5-inch drive in bay 2, you must attach the 5.25-inch conversion kit to the 3.5-inch drive.

   Note: An optional external diskette drive can only be installed in bay 3.

10. Connect one end of the applicable signal cable into the rear of the drive and make sure that the other end of this cable is connected into the applicable SATA connector on the system board.

11. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).

12. If you have another drive to install or remove, do so now.

13. Connect the power cable to the rear of the drive. The connectors are keyed and can be inserted only one way.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 30.

Installing a tape drive

To install a tape drive **3** , complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 7.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Remove the side cover (see "Removing the side cover" on page 10).

4. Remove the two-piece bezel (see "Removing the two-piece bezel" on page 11).

5. Use a screwdriver to pry the filler panel **2** and EMC shield **1** away from the server.

6. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.

7. Set any jumpers or switches on the drive according to the documentation that comes with the drive.

8. Remove the drive retainer clip **4** from the side of the drive cage of bays one or two. Slide the drive retainer clip to the right to remove it from the drive cage; then, snap the drive retainer clip into the screw holes on the side of the drive.

9. Slide the drive into the bay.
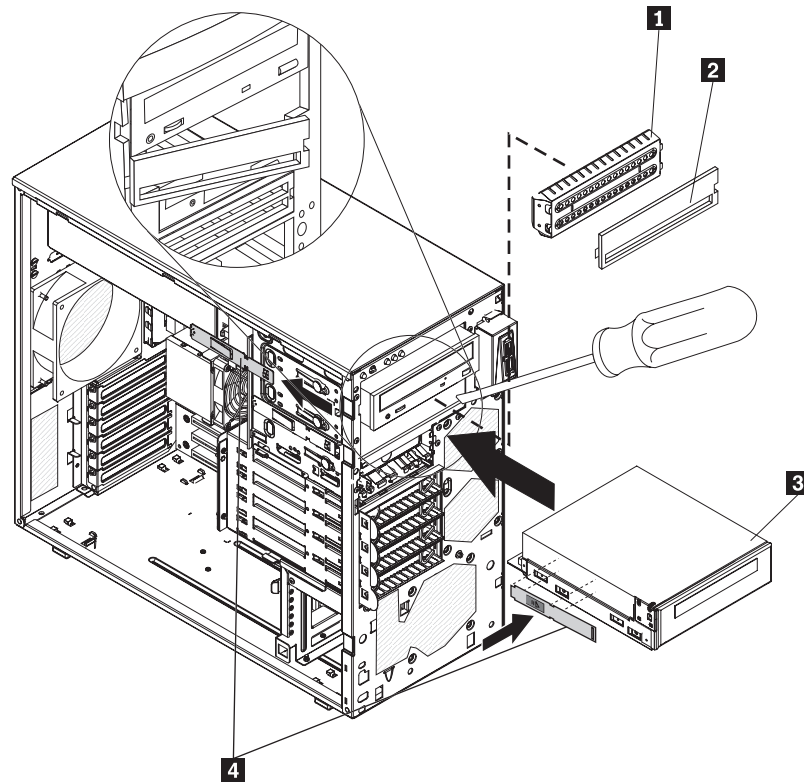
   Note: A tape drive can be installed in bay 1 or 2.

10. Connect one end of the applicable signal cable into the rear of the drive and make sure that the other end of this cable is connected into the applicable connector on the system board.

11. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).

12. If you have another drive to install or remove, do so now.

13. Connect the power cable to the rear of the drive. The connectors are keyed and can be inserted only one way.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 30.

Installing a hot-swap SAS or hot-swap SATA hard disk drive

Some hot-swap SAS models support 2.5-inch or 3.5-inch hot-swap SAS hard disk drives. The hot-swap SATA models support 3.5-inch hot-swap SATA hard disk drives. Before you install a hot-swap hard disk drive, read the following information:

- Depending on your model, the server supports the following number of hot-swap drives:
  - Four 3.5-inch hot-swap SAS
  - Four 3.5-inch hot-swap SATA
  - Four 2.5-inch hot-swap SAS
  - Eight 2.5-inch hot-swap SAS

- You must install either all SAS hot-swap hard disk drives or all SATA hot-swap hard disk drives in the server. Do not use both SAS and SATA drives in the same server.
- Install drives in the following sequence:
  – For server models that support four hard disk drives, install the drives starting from the top bay to the bottom bay (bay 4, 5, 6, and then 7).
  – For server models that support eight hard disk drives, install the drives starting from left to right (bay 4, 5, 6, 7, 8, 9, 10, and then 11).
- Inspect the drive tray for signs of damage.
- Make sure that the drive is correctly installed in the tray.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays.

The server hot-swap bays are connected to a SAS/SATA hard disk drive backplane. This backplane, also known as the hot-swap-drive backplane, is the printed circuit board behind these bays.

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

To install a hot-swap SAS or hot-swap SATA hard disk drive, complete the following steps:
1. Read the safety information that begins on page v and "Installation guidelines" on page 7.
2. Unlock the side cover.
3. Remove the lower bezel (see "Removing the two-piece bezel" on page 11).
4. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
5. Install the hard disk drive in the hot-swap bay:
   a. Make sure that the drive tray handle is open.
   b. Align the drive assembly with the guide rails in the bay.

Table 6. Illustrations of the server models with four and eight drive bays

Server model with four hot-swap drive bays	Server model with eight hot-swap drive bays
1 Drive-tray assembly **2** Drive tray handle (in open position)	**1** Drive-tray assembly **2** Drive tray handle (in open position)
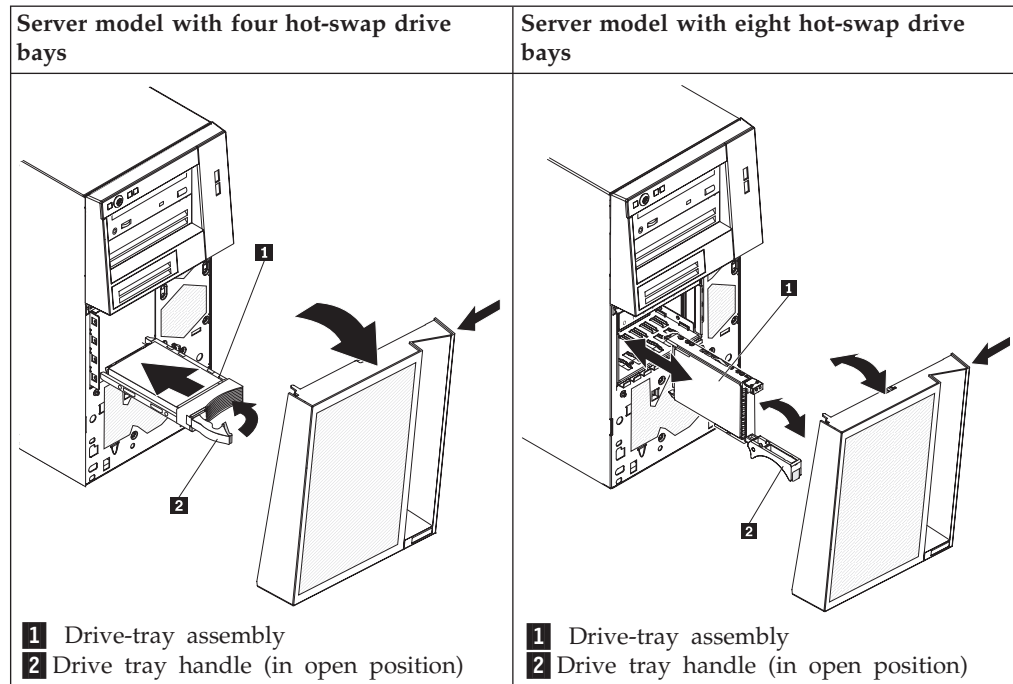
    c. Gently push the drive assembly into the bay until the drive stops.

    d. Rotate the drive tray handle to the closed (locked) position.

    e. Check the hard disk drive status indicator to make sure that the hard disk drive is operating correctly. (You might have to restart the server before the drive is recognized.) If the amber hard disk drive status LED for a drive is lit continuously, it indicates that the drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, it indicates that the drive is being accessed.

> **Note:** If the server is configured for RAID operation using an optional ServeRAID adapter, you might have to reconfigure your disk arrays after you install hard disk drives. See the adapter documentation on the *IBM® ServeRAID Support* CD for additional information about RAID operation for your adapter.

6. If you are installing additional hot-swap hard disk drives, do so now.

If you have other devices to install or remove, do so now; otherwise go to "Completing the installation" on page 30.

IDs for hot-swap hard disk drives

On some models, the hot-swap-drive backplane controls the IDs of the internal hot-swap drive bays. The following table lists the IDs of the hard disk drives and backplane that are connected to one channel in the hot-swap models. In the typical configuration, the standard hard disk drives and backplane are connected to channel A. This table applies only to server models that support four hot-swap hard disk drives.

Table 7. Drive bay IDs for hot-swap SAS/SATA models with four drive bays

Drive bay	ID
4	0

Drive bay	ID
5	1
6	2
7	3

If your server is the eight-bay, 2.5 inch hot-swap SAS model, the IDs of the hard disk drives are shown in the following table.

Table 8. Drive bay IDs for the hot-swap 2.5-inch SAS models with eight bays

Drive bay	ID
4	0
5	1
6	2
7	3
8	4
9	5
10	6
11	7

Installing a simple-swap SATA hard disk drive

Some server models support four 3.5-inch simple-swap SATA hard disk drives, which are accessible from the front of the server. You must disconnect all power from the server before you remove or install simple-swap drives in the server. Before you install a simple-swap SATA hard disk drive, read the following information:

- You can install four simple-swap SATA hard disk drives in the simple-swap models (7-drive-bay models).
- Install the drives starting from the top bay to the bottom bay (bay 4, 5, 6, and then 7).
- The four simple-swap SATA hard disk drive connects to the SATA 0 through SATA 3 connectors on the system board as follows:
  - The drive in bay 4 connects to the SATA 0 connector on the system board.
  - The drive in bay 5 connects to the SATA 1 connector on the system board.
  - The drive in bay 6 connects to the SATA 2 connector on the system board.
  - The drive in bay 7 connects to the SATA 3 connector on the system board.
  -
-

Attention: Simple-swap hard disk drives are not hot-swappable. Disconnect all power from the server before you remove or install a simple-swap hard disk drive.

To install a simple-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 7.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.

3. Unlock the side cover (the bezel will not disengage from the server if the cover is locked).
4. Remove the lower bezel (see "Removing the two-piece bezel" on page 11).
5. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
6. Align the drive assembly with the guide rails in the bay (the connector end of the drive goes in first).
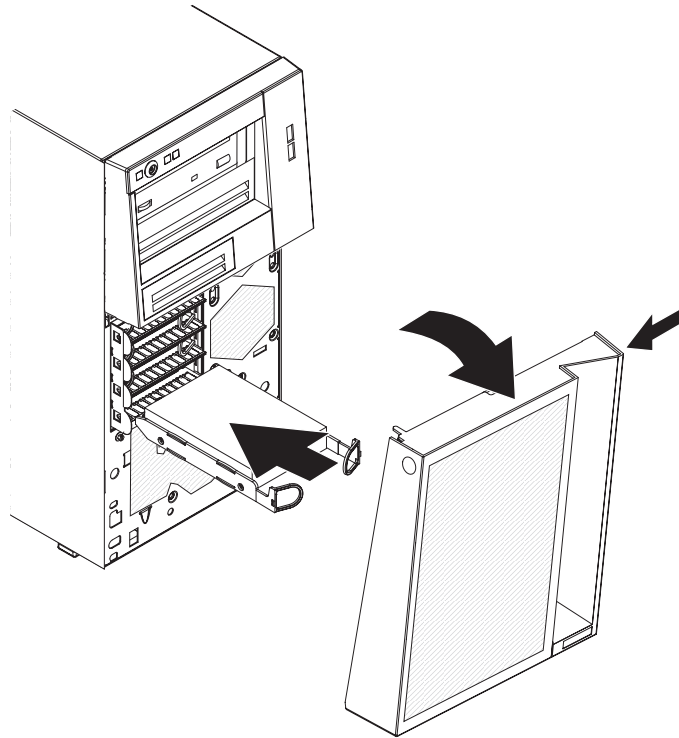
7. Pull the loops of the drive assembly toward each other; then, carefully slide the drive assembly into the drive bay until it stops, and release the loops.

   Note: Do not release the loops on the drive assembly until it is completely seated.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 30.

The simple-swap-drive backplate controls the IDs of the internal simple-swap drive bays. The following table lists the IDs of the hard disk drives and backplate in simple-swap models. This table applies only to server models that support four hard disk drives.

Table 9. Drive bay IDs for simple-swap models

Drive bay	ID
4	0
5	1
6	2
7	3

Power and signal cables for internal drives

The server uses cables to connect SATA-attached, simple-swap SATA, hot-swap SAS, and hot-swap SATA devices to the power supply and to the system board. (For the locations of the system-board connectors, see the *User Guide* on the *ThinkServer Documentation* DVD.) Review the following information before you connect power and signal cables to internal drives:

- The drives that are preinstalled in the server come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.
- When you install a drive, make sure that one of the signal cable connectors is connected to the drive and that the connector at the other end of the signal cable is connected to the system board.

The following cables are provided:

- **Power cables:** Four-wire power cables connect the drives to the power supply. At the ends of these cables are plastic connectors that can be attached to different drives; these connectors vary in size. Use either a four-wire power cable or SATA power cable with SATA drives, but do not use both at the same time (use one or the other).
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect SATA attached, SATA, SAS, and diskette drives to the system board. Two or three types of signal cables come with the server:
  - **SATA attached (for optical drives):** The flat SATA-attached signal cable has two connectors. One of these connectors is attached to the optical drive, and one is attached to one of the connectors on the system board.
  - **(Optional) USB diskette drive:** The narrower signal cable has two connectors. One is attached to the diskette drive, and the other is connected to the floppy drive connector (J11) on the system board.
  - **Simple-swap SATA:** Simple-swap SATA models come with four SATA cables that are already connected to the system board and the backplate at the rear of the simple-swap drive cage.
  - **Hot-swap SAS/SATA:** Hot-swap SAS/SATA models come with a single data cable that connects the SAS/SATA controller to the hot-swap backplane. This cable provides inherent connectivity for the four SAS or SATA drives that the server supports. Therefore, additional cabling is not required for these drives.

    For more information about the requirements for SAS/SATA cable and connecting SAS/SATA devices, see the documentation that comes with these devices.

    For a list of supported optional devices for the server, go to: http://www.lenovo.com/accessories.

Installing an adapter

The following notes describe the types of adapters that the server supports and other information that you must consider when you install an adapter.

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you have to change the switch setting or jumper settings on the adapter, follow the instructions that come with the adapter.
- Read the documentation that comes with your operating system.
- The server comes with the following adapter connectors or slots:
  - Slot 1, PCI Express x8

- Slot 2, PCI Express x4 (x1)

    Important: The x4 designation in parentheses for slot 2 identifies an x4 slot that is designed to support x4 and x1 adapters that can downshift to operate at the x1 bandwidth. For example, if you install an x4 adapter in slot 2 that can downshift to x1 bandwidth, it will run at the x1 bandwidth. The x4 connector (slot 2) can be used for x1 and x4 adapters. Check the information that comes with your adapter for compatibility information.
  - Slot 3, PCI-X 64-bit/133 MHz

    Note: PCI-X slot 3 is enabled when the optional mini-PCI-X enablement card is installed in the mini-PCI slot on the system board. When no mini-PCI-X enablement card is installed, PCI-X slot 3 has no function.
  - Slot 4, PCI 32-bit/33 MHz
  - Slot 5, PCI 32-bit/33 MHz
- Some server models come with a mini-SAS/SATA RAID controller installed. The SAS/SATA RAID controller enables integrated RAID level-0 and level-1. Some models also come with a ServeRAID-MR10i SAS/SATA controller that enables integrated RAID level-5 capability.
- The ServeRAID-MR10i SAS/SATA controller must be installed in slot 1, PCI Express x8.
- You can install the mini-PCI-X enablement card or the mini-SAS/SATA RAID controller in the mini-PCI slot on the system board.
- When the optional mini-PCI-X enablement card is installed in the mini-PCI slot, it passes PCI-X signals from the mini-PCI-X Enablement Card to PCI-X slot 3.
- When the optional mini-PCI-X enablement card is installed in the server, the server cannot support RAID level-0 and level-1.
- You can install supported full-length adapters in slots 1 through 5 (depending on your model).
- The 64-bit slot 3 supports 3.3 V PCI-X adapters.
- The 32-bit slots 4 and 5 support 5.0 V keyed PCI adapters; they do not support 3.3 V keyed adapters. Universal adapters are supported in slots 4 and 5 if they are universally keyed.
- An optional IBM Remote Supervisor Adapter II SlimLine can be installed only in the dedicated connector on the system board. For additional information, see the documentation that comes with this adapter.
- When you start the server for the first time after you install a Remote Supervisor Adapter II SlimLine, the startup process will take several minutes longer than a typical startup.
- The server scans PCI Express x8 slot 1, PCI Express x4 slot 2, PCI-X slot 3, and PCI slots 4 and 5 to assign system resources. Then, the server starts the PCI devices in the following order, if you have not changed the default startup sequence: PCI Express x8 slot 1, PCI Express x4 slot 2, PCI-X slot 3, PCI slot 4, and PCI slot 5.
- For a list of supported optional devices for the server, go to: http://www.lenovo.com/accessories.

For the locations of the expansion slots on the system board, see the *User Guide* on the *ThinkServer Documentation* DVD.

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

To install an adapter, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 7.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the side cover. See "Removing the side cover" on page 10.
3. Follow the cabling instructions, if any, that come with the adapter. Route the adapter cables before you install the adapter.
4. Follow the instructions that come with the adapter to set jumpers or switches, if any.
5. Rotate the rear adapter-retention bracket to the open (unlocked) position and remove it from the server.
6. Remove the screw that secures the expansion-slot cover to the chassis. Store the expansion-slot cover and screw in a safe place for future use.

   Note: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.

7. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.
8. If you are installing a full-length adapter, remove the blue adapter guide **1** (if any) from the end of the adapter.
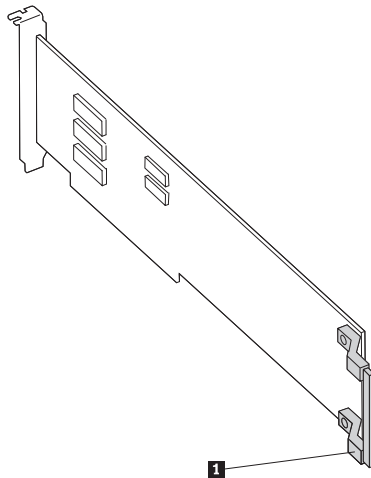
9. Carefully grasp the adapter by the top edge or upper corners, and align it with the expansion-slot guides; then, press the adapter *firmly* into the expansion slot. Move the adapter directly from the static-protective package to the expansion slot.

   Attention: Make sure that the adapter is correctly seated in the expansion slot before you turn on the server. Incomplete installation of an adapter might damage the system board or the adapter.
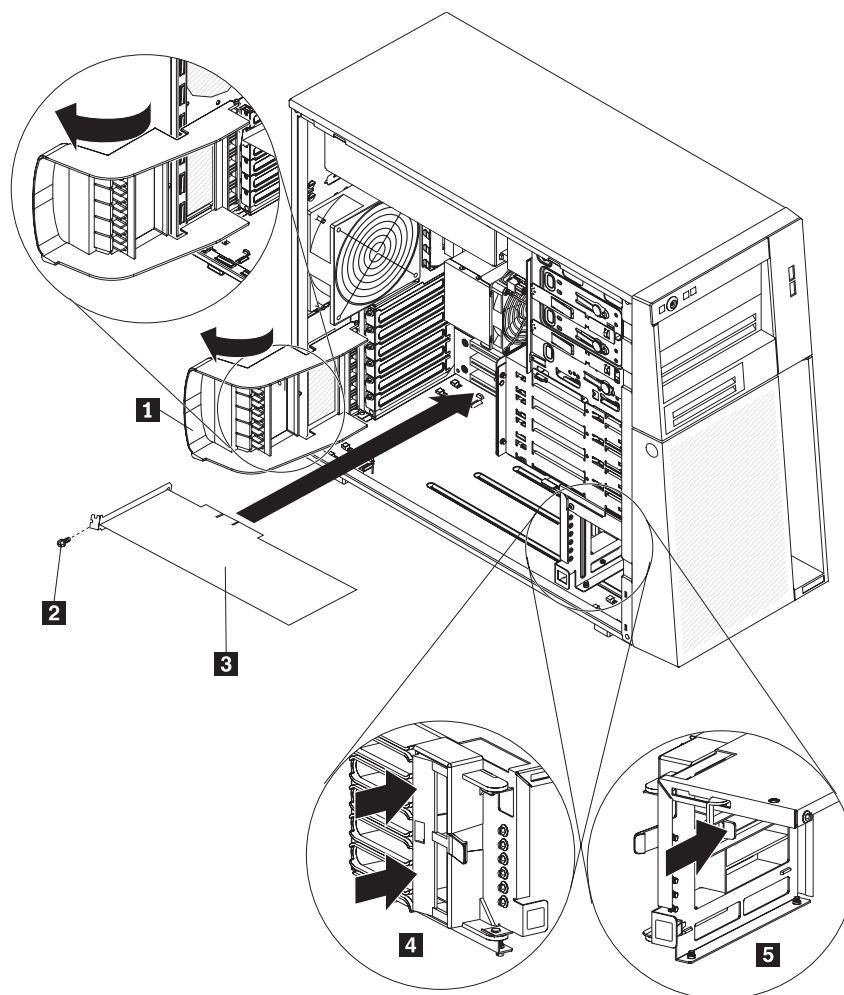
1	Rear adapter retention bracket	**4**	Left side of the Front adapter retention bracket
2	Expansion-slot screw	**5**	Right side of the Front adapter retention bracket
3	Adapter		

10. Install an expansion-slot screw at the rear of the adapter.

11. If you are installing a full-length adapter, press on the release lever on the right side of the front adapter-retention bracket to release the retaining tab on the left side of the bracket.

12. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans.

13. Reinstall the rear adapter-retention bracket; then, rotate the bracket to the closed position.

> **Note:** If any adapters in the server are large or have heavy cables attached to them, you can remove the rear adapter-retention bracket and secure all of the adapters with expansion-slot screws.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 30.

Completing the installation

To complete the installation, you must reinstall the two-piece bezel, reinstall the side cover, connect all the cables and, for some devices, run the Configuration/Setup Utility program. Follow the instructions in this section.

Reinstalling the two-piece bezel

To reinstall the two-piece bezel, complete the following steps:

1. Install the upper bezel:

   a. Insert the two right-side tabs on the upper bezel into the matching holes on the right side of the chassis.

   b. Rotate the upper bezel to the left side of the chassis and press the bezel clips **1** into the matching indentations on the left side of the chassis until the bezel clips snap into place.
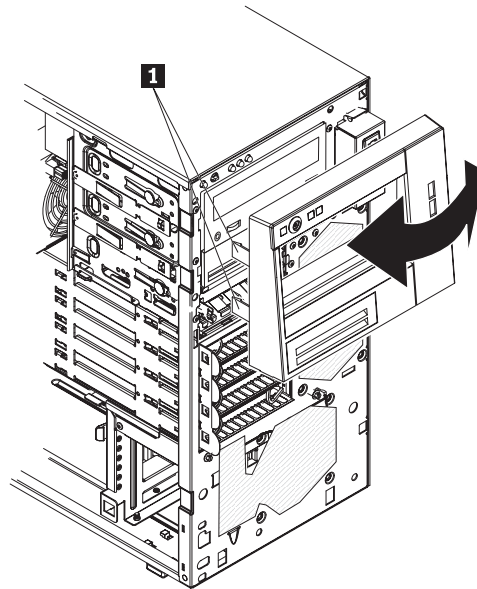
2. Install the lower bezel:
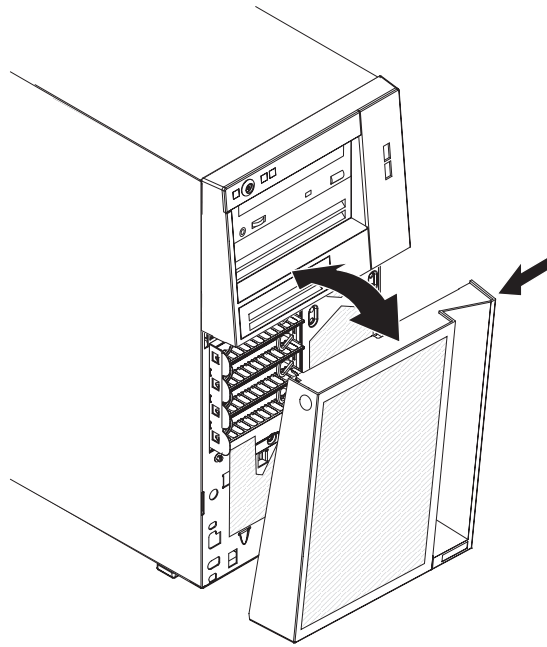
a. Insert the two bottom tabs on the lower bezel into the matching holes in the front of the chassis.

b. Rotate the top of the lower bezel up to the chassis; then, press the blue release tab on the right side of the lower bezel and completely close the lower bezel until it locks securely into place.

Reinstalling the side cover

If you removed the bezel, reinstall it before you reinstall the side cover. See "Reinstalling the two-piece bezel" on page 30.

Note: The rear adapter-retention bracket rests against the server side cover. You might find it easier to lay the server on its side to reinstall the side cover.

To reinstall the side cover, complete the following steps:

1. Before you install the side cover, make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server. Also, make sure that all internal cables are correctly routed.

   Note: The cover-release latch **1** must be in the unlocked (opened) position before you install the side cover.

2. Position the lip on the bottom edge of the side cover on the ledge on the bottom of the chassis; then, rotate the cover up to the chassis, and then press down on the cover release latch and push the cover completely closed until it latches securely into place.
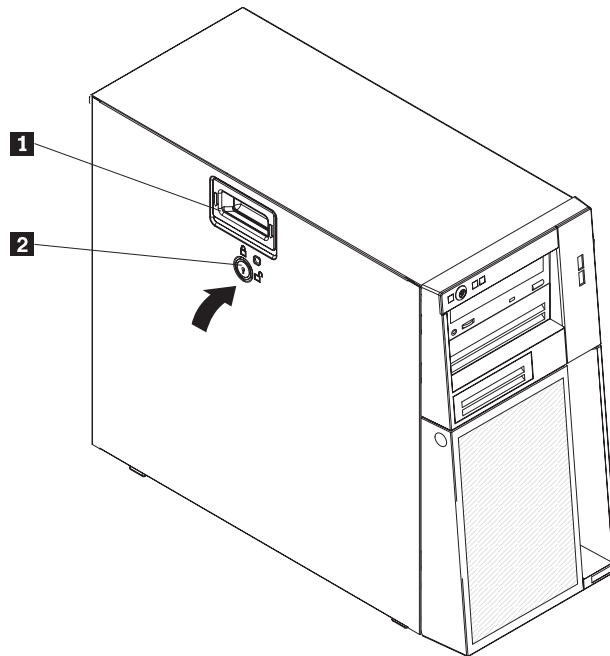
3. Close the cover-release latch to secure the side cover in place.
4. Lock the side cover.

Connecting the cables

Attention: To prevent damage to equipment, connect the power cords last.

If the server cables and connector panel have color-coded connectors, match the color of each cable end with the color of the connector. For example, match a blue cable end to a blue connector on the panel, a red cable end with a red connector, and so on.

The following illustration shows the input/output (I/O) connectors on the rear of the server.

Table 10. Connectors on the rear of the server
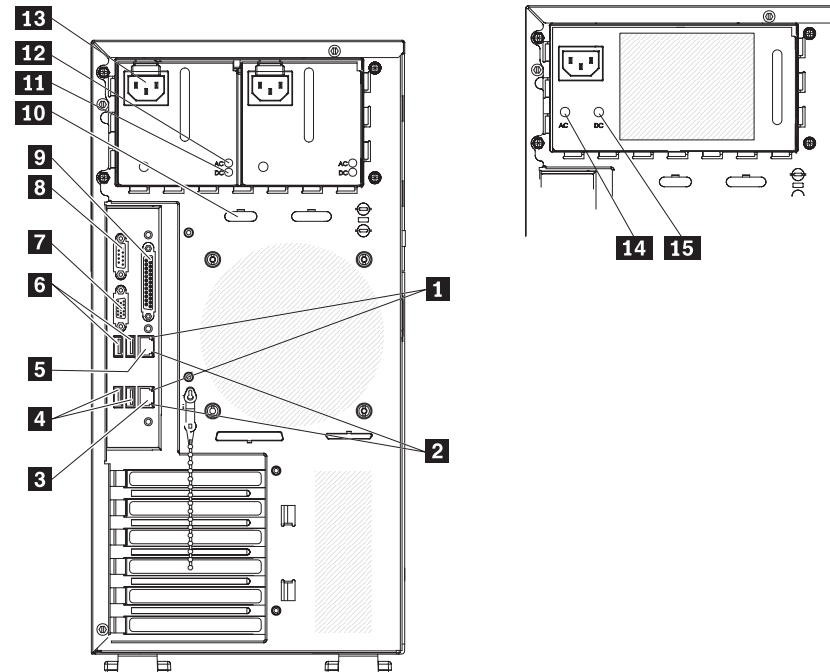
1	Ethernet transmit/ receive activity LED (amber)	**8**	Serial 1 (Com1) connector
2	Ethernet link status LED (green)	**9**	Parallel connector
3	Remote Supervisor Adapter II SlimLine (Ethernet) connector	**10**	Serial 2 (Com2) connector
4	USB connectors 1 and 2	**11** and **15**	DC power LED
5	Ethernet connector	**12** and **14**	AC power LED
6	USB connectors 3 and 4	**13**	Power cord connector
7	Video connector		

Updating the server configuration

When you start the server for the first time after you add or remove an internal or external device, you might receive a message that the configuration has changed. The Configuration/Setup Utility program starts automatically so that you can save the new configuration settings. For more information, see the section about configuring the server in the *User Guide* on the *ThinkServer Documentation* DVD.

Some optional devices have device drivers that you must install. For information about installing device drivers, see the documentation that comes with each device.

If the server has a RAID adapter and you have installed or removed a hard disk drive, see the documentation that comes with the adapter for information about reconfiguring the disk arrays.

If you have installed a Remote Supervisor Adapter II SlimLine to manage the server remotely, see the Remote Supervisor Adapter II documentation for information about setting up, configuring, and using the adapter.

Chapter 3. Server controls, LEDs, and power

This section describes the controls and light-emitting diodes (LEDs) and how to turn the server on and off.

Front view

The following illustration shows the controls, LEDs, and connectors on the front of the server.
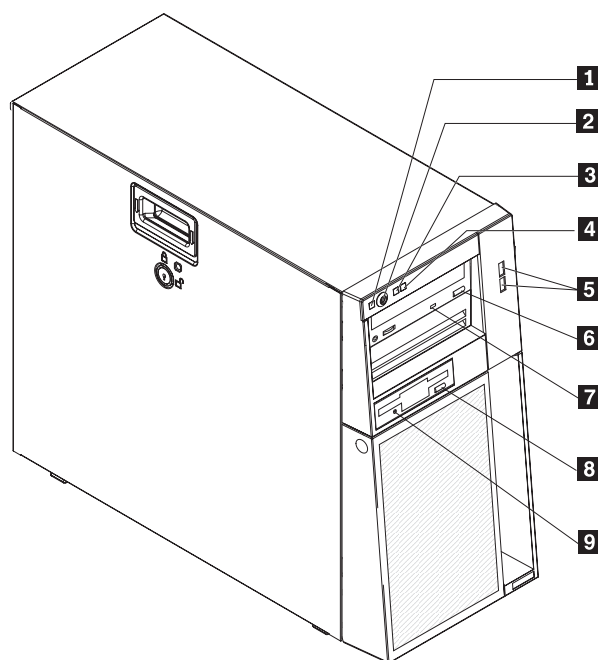
1	Power-on LED	**6**	CD-eject or DVD-eject button
2	Power-control button	**7**	CD or DVD drive activity LED
3	Hard disk drive activity LED	**8**	Optional diskette-eject button
4	System-error LED	**9**	Optional diskette drive activity LED
5	USB connectors		

Power-on LED

> When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and still connected to an ac power source. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed. A power LED is also on the rear of the server.

> **Note:** If this LED is off, it does not mean that there is no electrical power in the server. The LED might be burned out. To remove all electrical power from the server, you must disconnect the power cords from the electrical outlets.

Power-control button

> Press this button to turn the server on and off manually. You can install it to prevent the server from being turned off accidentally.

Hard disk drive activity LED
When this LED is flashing, it indicates that the associated hard disk drive is in use.

System-error LED
When this amber LED is lit, it indicates that a system error has occurred. An LED on the system board might also be lit to help isolate the error. See Chapter 5, "Solving problems," on page 51 for additional information. Detailed troubleshooting information is in the *Hardware Maintenance Manual*.

> **Note:** When a PCI Express error LED and the system-error LED is lit, it indicates that a PCI Express error has occurred. The system-error LED will turn off when you reboot the server. When a DIMM error LED and the system-error LED is lit, it indicates that a DIMM error has occurred. After you correct the DIMM error, the DIMM error LED and the system-error LED will turn off.

USB connectors
Connect USB devices to these connectors.

CD-eject or DVD-eject button
Press this button to release a CD from the CD drive or a DVD from the DVD drive.

CD or DVD drive activity LED
When this LED is lit, it indicates that the CD drive or DVD drive is in use.

(Optional) diskette-eject button
Press this button to release a diskette from the diskette drive.

(Optional) diskette drive activity LED
When this LED is lit, it indicates that the diskette drive is in use.

Hot-swap hard disk drive activity LED (some models)
On some server models, each hot-swap drive has a hard disk drive activity LED. When this green LED is flashing, it indicates that the associated hard disk drive is in use.

When the drive is removed, this LED also is visible on the hard disk drive backplane, next to the drive connector. The backplane is the printed circuit board behind drive bays 4 through 7 (or bays 4 through 11 on some 2.5-inch hard disk drive SAS models).

Hot-swap hard disk drive status LED (some models)
On some server models, each hot-swap hard disk drive has an amber status LED. If this amber status LED for a drive is lit, it indicates that the associated hard disk drive has failed.

If an optional RAID controller is installed in the server and the LED flashes slowly (one flash per second), it indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.

When the drive is removed, this LED also is visible on the hard disk drive backplane, below the hot-swap hard disk drive activity LED.

Rear view

The following illustration shows the connectors and LEDs on the rear of the server.
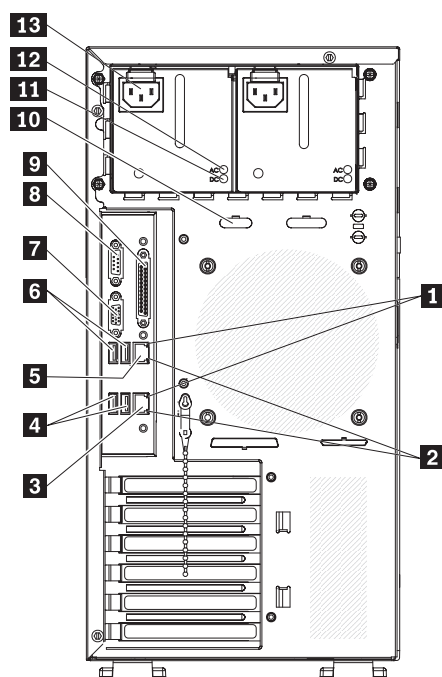
1	Ethernet transmit/ receive activity LED (amber)	**8**	Serial 1 (Com1) connector
2	Ethernet link status LED (green)	**9**	Parallel connector
3	Remote Supervisor Adapter II SlimLine (Ethernet)	**10**	Serial 2 (Com2) connector
4	USB connectors 1 and 2	**11**	DC power LED
5	Ethernet connector	**12**	AC power LED
6	USB connectors 3 and 4	**13**	Power cord connector
7	Video connector		

Power-cord connector
Connect the power cord to this connector.

AC power LED
On some server models, each hot-swap power supply has an ac power LED and a dc power LED. During typical operation, both the ac and dc power LEDs are lit.

DC power LED
On some server models, each hot-swap power supply has a dc power LED and an ac power LED. During typical operation, both the ac and dc power LEDs are lit.

Serial 2 connector
Connect a 9-pin serial device to this connector.

Parallel connector
Connect a parallel device to this connector.

Serial 1 connector
Connect a 9-pin serial device to this connector.

Video connector
> Connect a monitor to this connector.

USB connectors
> Connect USB devices to these connectors.

Ethernet connector
> Use this connector to connect the server to a network.

Ethernet transmit/receive activity LED
> This LED is on the Ethernet connector on the rear of the server. When this LED is lit, it indicates that there is activity between the server and the network.

Ethernet link status LED
> This LED is on the Ethernet connector on the rear of the server. When this LED is lit, it indicates that there is an active connection on the Ethernet port.

Remote Supervisor Adapter II SlimLine/Ethernet connector
> Use this connector to connect the Remote Supervisor Adapter II SlimLine to a network.

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except the service processor is shut down; however, the server can respond to requests from the service processor, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to ac power but not turned on.

Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, and one or more fans might start running to provide cooling while the server is connected to power. You can turn on the server and start the operating system by pressing the power-control button.

The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If your operating system supports the systems-management software for an optional Remote Supervisor Adapter II SlimLine, the systems-management software can turn on the server.
- If an optional Remote Supervisor Adapter II SlimLine is installed in the server, the server can be turned on from the Remote Supervisor Adapter II SlimLine user interface.

Note: When 4 GB or more of memory (physical or logical) is installed, some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured PCI optional devices.

Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests from the service processor, such as a remote request to turn on

the server. While the server remains connected to ac power, one or more fans might continue to run. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.
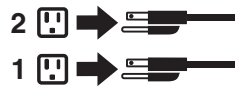
The server can be turned off in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- If an optional Remote Supervisor Adapter II SlimLine is installed in the server, the server can be turned off from the Remote Supervisor Adapter II SlimLine user interface.
- The server can turn itself off as an automatic response to a critical system failure.

Chapter 4. Configuring the server

Lenovo provides a number of programs to assist you with getting your server up and running quickly.

- **ThinkServer EasyStartup program**

  This program simplifies the process of configuring your RAID controller and installing supported operating systems and device drivers. It is on the *ThinkServer EasyStartup* DVD provided with your server. For details, see "Using the *ThinkServer EasyStartup* DVD."

- Configuration/Setup Utility program

  This program enables you to configure hardware settings and preferences in the BIOS. For details, see "Using the Configuration/Setup Utility program" on page 47.

- RAID configuration programs
  - Adaptec RAID (HOSTRaid) Configuration Utility program:

    This program is part of the BIOS code on models that have an integrated ServeRAID-8s (Adaptec HostRAID) controller.
  - LSI Configuration Utility

    This program is part of the BIOS code on models with an optional LSI storage controller with RAID capability.

- Broadcom Gigabit Ethernet Utility program:

  Use this program to configure the network as a startable (bootable) device or specify where the network startup option is displayed in the startup sequence. For additional information, see "Enabling the Broadcom NetXtreme Gigabit Ethernet Boot Agent" on page 47.

- ThinkServer EasyManage products

  ThinkServer EasyManage Core Server and ThinkServer EasyManage Agent work together to provide centralized hardware and software inventory management and secure automated system management through a single console. For details, see "Installing ThinkServer EasyManage software" on page 45.

For more information about these programs, see "Configuring the server" in the *User Guide* on the *ThinkServer Documentation* DVD.

Using the *ThinkServer EasyStartup* DVD

The *ThinkServer EasyStartup* DVD simplifies the process of configuring your RAID controller and installing an operating system. The program works in conjunction with your Windows® or Linux® operating-system installation disc to automate the process of installing the operating system and associated device drivers.

If you did not receive an *ThinkServer EasyStartup* DVD with your server, you can download an image from the Lenovo Support Web site at http://www.lenovo.com/support.

The EasyStartup program has the following features:
- Self-booting DVD
- Easy-to-use, language-selectable interface
- Integrated help system

- Automatic hardware detection
- RAID configuration utility
- Device drivers (based on the server model and detected devices)
- Selectable partition size and file system type
- Support for Windows, Red Hat, and SUSE server operating systems
- Installs the operating system and device drivers in an unattended mode to save time
- Creates a reuseable response file that can be used with similarly configured Lenovo servers to make future installations even faster.

Before you use the *ThinkServer EasyStartup* DVD

Functionality and supported operating systems can vary with different versions of the EasyStartup program. To learn more about the version you have, do the following:

1. Insert the *ThinkServer EasyStartup* DVD and restart the server.
2. Advance to the Home screen.
3. Click **Compatability notes**. The compatability notes provide detailed information about the operating systems and server configurations supported by that version of the EasyStartup program.
4. Click **User Guide**. The User Guide provides an overview of the various functions provided by that version of the EasyStartup program.

Before using the EasyStartup program to install an operating system, make sure any external storage devices and fiber channels are configured correctly.

Configuring RAID

The RAID configuration feature that is part of the EasyStartup program enables you to view and change RAID settings for supported RAID controllers. Through this feature, you have the ability to select one RAID level for each installed controller, and the program automatically will use the discs currently attached to the controller to support that RAID level. This method satisfies most users' needs.

Note: Refer to the EasyStartup User Guide for information about the RAID controllers that are supported. For this model, the integrated ServeRAID-8s (Adaptec HostRAID) controller is not supported for configuration using the EasyStartup program.

If you have a need to assign a primary and secondary RAID on the same controller and assign some of your discs to the primary RAID and some to the secondary RAID, you can use either of the following methods:

- **Manually remove the drives that you do not want included in your array before you configure your RAID controller through the EasyStartup program.**

  This method enables you to use the EasyStartup program to configure your RAID controller and install the operating system. After the operating system is installed, reinstall the drives and use the RAID configuration utility provided in the firmware to configure the secondary RAID.

- **Configure the controller using the RAID configuration utility provided in the firmware before you use the EasyStartup program.**

  For details, see 49. After your RAID controller is configured, start the EasyStartup program and install your operating system.

EasyStartup overview

The EasyStartup program requires a supported Lenovo server with an enabled, startable (bootable) DVD drive. In addition to the *ThinkServer EasyStartup* DVD, you also must have the operating-system installation CD or DVD and the product key or installation number for the operating system (if provided).

The EasyStartup program performs the following tasks:

- Detects installed hardware devices
- Guides you through the process of configuring one or more RAID controllers and optionally saves the settings in a RAID response file
- Guides you through the process of creating a response file for the unattended installation of the operating system
- Enables you to create scripts or commands that run at the end of the operating system installation process
- Facilitates the installation of the ThinkServer EasyManage products and DVD-burning software (Windows installations only)
- Prepares the hard disk for installation
- Prompts you to insert the operating-system installation disc
- Initiates an unattended installation of the operating system and device drivers

Setup and configuration

When you start the *ThinkServer EasyStartup* DVD, you will be prompted for the following:

- Select the language in which you want to view the program.
- Select the language of the keyboard you will be using with the program.

Note: The following language keyboards are supported: English, French, German, Spanish, Japanese, Korean, Turkish, Italian, and Dutch.

You will then see one or more reminders about configuring storage devices, and then you will be presented with the Lenovo License Agreement. Read the license agreement carefully. You must agree with terms in order to continue.

After agreeing to the license agreement, you will be given the following choices:

- Continue to the main program interface
- Use a shortcut to install an operating system based a response file that you previously created using the EasyStartup program
- Use a short cut to configure RAID controllers based on a RAID response file that you previously created using the EasyStartup program

If you continue to the main program interface, you will have the following selectable options:

- **Compatibility notes:** This selection provides information about the operating systems and server configurations supported by that version of the EasyStartup program.
- **User Guide:** This selection provides information about the features provided by that version of the EasyStartup program.
- **Hardware list:** This selection displays a list of hardware devices detected by the EasyStartup program.
- **Configure RAID:** This selection enables you to view the current RAID configuration for each installed RAID controller and make changes if needed.

- **Install operating system:** This selection displays a series of choices and prompts to collect information required for installation, prepares the hard disk for installation, and then initiates the installation process using the user-provided operating-system installation CD or DVD.
- **About:** This selection displays version information and legal notices.

Typical operating system installation

When you select **Install operating system**, you will be prompted for information required for the installation. The prompts vary depending on the operating system selected. This section describes the tasks associated with a typical Windows Server operating system installation. Each task must be completed before moving to the next task.

Note: Ensure that your RAID controller is correctly configured before you select an operating system to install.

- **Select operating system:** This task enables you to select the operating system that you will be installing.
- **Select disk:** This task enables you to select the disk where you want to install the operating system.

  Note: The disk that you select must be set as the boot disk in UEFI.
- **Partitions options:** This task enables you to choose whether you want to repartition the selected drive or use an existing partition.
- **Partition settings:** This task enables you to choose the file system type and define the partition size.
- **Installation settings:** This task prompts you for user and system settings, the operating system product key, and the administrator password.
- **Network settings:** This task prompts you for domain and workgroup settings, Ethernet controller type, IP address settings, DNS settings, and WINS address settings.
- **Install applications:** This task enables you to run custom commands or scripts at the end of the installation process. It also facilitates the installation of DVD-burning software and install ThinkServer EasyManage software products.
- **Install Windows components:** This task enables you to install optional Windows components such as IIS, ASP.NET, and SNMP.
- **Confirm settings:** This task enables you to review all of the information you provided.
- **Save response file:** This task gives you the option of saving the information on a diskette or USB device as a response file for future installations on similarly configured Lenovo servers.
- **Start installation:** This task starts the actual installation process. First, the disk is prepared using the disk and partition information you specified. Then you are prompted to insert the operating system disk, and the operating system is installed using the information that you specified.

Installing your operating system without using EasyStartup

If you have already configured the server hardware and you are not using the EasyStartup program to install your operating system, complete the following steps to download the latest operating-system installation instructions from the Lenovo Support Web site:

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TS100**, and click **Continue**.
4. Select the operating system that you want from the **Operating system** list, and click **Continue**.
5. Click **Operating system installation** to download instructions to install the operating system.

Installing ThinkServer EasyManage software

You can download and install the the ThinkServer® EasyManage Core Server program from http://www.lenovo.com/support. After one instance of the ThinkServer EasyManage Core Server has been installed, you can use the console to deploy the agent to other servers and clients on the network.

Also, the ThinkServer EasyStartup™ program provides options to prepare your server for the installation of these products as part of the operating system installation process.

Installation requirements

Before installing ThinkServer EasyManage software on your server, your environment must meet the following requirements:

- Microsoft® Windows Server 2003 32-bit operating system is installed on the server where you intend to install the Core Server.
- The original Windows Server operating system installation CDs are available in case files are needed while installing the prerequisites.
- The server has Internet access to obtain prerequisites and to activate the software after the installation is complete.
- The server has a static IP address.
- The server is not a domain controller. However, it is recommended to have the server join a domain.
- The account that you use to log in and to install the Core Server has Administrator privileges on the server with full read/write access. Ideally, this account is also a Domain Administrator account. This account will be used to create the initial administrator-level account used to log in to the ThinkServer EasyManage console.
- Any previous agent from EasyManage or LANDesk must be removed prior to installing the Core Server and Management Console.

Installation order

The order in which you install the operating system and Windows Components is critical to install ThinkServer EasyManage software successfully. To ensure a clean, working installation of ThinkServer EasyManage software, use the following installation order:

1. Install Microsoft Windows Server 2003 Service Pack 1.
2. Install the following Windows Components: See "Installing Windows Components on the Core Server" on page 46.
3. Use Windows Update to install all available critical updates.
4. Download Microsoft .NET Framework 2.0 Service Pack 1 or newer from the following Web site: http://www.microsoft.com/downloads/

details.aspx?FamilyID=0856eacb-4362-4b0d-8edd-aab15c5e04f5
&DisplayLang=en. Install the software using the default settings.

5. Download Microsoft Web Services Enhancement 2.0 Service Pack 3 from the following Web site: http://www.microsoft.com/downloads/ details.aspx?FamilyID=1ba1f631-c3e7-420a-bc1e-ef18bab66122&DisplayLang=en. Install the software using the default settings.

   Note: This specific version is required.

6. Use Windows Update to install all available critical updates.

7. Launch the EasyManage installation.

8. After ThinkServer EasyManage is installed, enable Security and Patch Manager to obtain the LANDesk 8.8 Software Updates. In the console application, click **Help -> LANDesk -> Security Updates** for a guide to configuring Security and Patch Manager.

9. Install Adobe® Flash Player 9 if you plan to use the Management Console functions from the same server on which the Core Server is installed. You can obtain Adobe Flash Player 9 from the Adobe Web site: http:// www.adobe.com/products/flashplayer/

Installing Windows Components on the Core Server

To install IIS, ASP.Net, and SNMP on the Core Server, do the following procedure for each component:

1. In the Windows Control Panel, double-click **Add or Remove Programs**.

2. In the toolbar on the left, click **Add/Remove Windows Components** to launch the Windows Components Wizard.

3. Select from the Components list:
   - When installing IIS and ASP.NET, click **Application Server**; then, click **Details**.
   - When installing SNMP, click **Management and Monitoring Tools**; then, click **Details**.

4. Select the component that you want to install:
   - When installing IIS, select **Internet Information Services (IIS)**; then, click **OK**.
   - When installing ASP.NET, select **ASP.NET**; then, click **OK**.
   - When installing SNMP, select **Simple Network Management Protocol**; then, click **OK**.

5. Click **Next** to continue the wizard.

6. If prompted, insert the original Windows OS CD. If the autorun launches when you insert the CD, close it. The Windows Components Wizard will automatically detect and install the necessary files.

7. Click **Finish**.

Uninstalling the LANDesk Software Agent

If the Core Server has LANDesk agents on it from a previous Management Suite release, it will fail the autorun prerequisite check. You must remove the old agents by running uninstallwinclient.exe from the \Program Files\LANDesk\ ManagementSuite folder.

Using the Configuration/Setup Utility program

Configuration/Setup is a menu-driven utility that is part of the BIOS. You can use it to perform the following tasks:

- Change interrupt request (IRQ) settings
- Change the startup sequence
- Configure serial port assignments
- Resolve configuration conflicts
- Set the date and time
- Set passwords and security settings

To start the Configuration/Setup Utility program, complete the following steps:

1. Turn on the server. If the server is already on when you start this procedure, you must shut down the operating system, turn off the server, wait a few seconds until all in-use LEDs are turned off, and restart the server.

2. When the message `Press F1 for Configuration/Setup, Press F12 for Boot Menu` is displayed, press F1. (This prompt is displayed on the screen for only a few seconds. You must press F1 quickly.) If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Configuration/Setup Utility menu. If you do not type the administrator password, a limited Configuration/Setup Utility menu is available.

3. Follow the instructions on the screen.

Using the Boot Menu program

The Boot Menu program is a built in, menu-driven configuration program that you can use to temporarily redefine the first startup device without changing settings in the Configuration/Setup Utility program.

To use the Boot Menu program, complete the following steps:

1. Restart the server.
2. Press F12.
3. Select the startup device.

The next time the server is started, it returns to the startup sequence that is set in the Configuration/Setup Utility program.

Enabling the Broadcom NetXtreme Gigabit Ethernet Boot Agent

The Broadcom NetXtreme Gigabit Ethernet Boot Agent is part of the BIOS. You can use it to configure the network as a startable device, and you can customize where the network Startup optional devices occurs in the startup sequence. Enable and disable the Broadcom NetXtreme Gigabit Ethernet Boot Agent from the Configuration/Setup Utility program.

To enable the Broadcom NetXtreme Gigabit Ethernet boot agent, complete the following steps:

1. From the Configuration/Setup Utility main menu, select **Devices and I/O Ports** and press Enter.

2. Select **Planar Ethernet** and set it to **Enabled**, if it is not already enabled. Press Esc to return to the Configuration/Setup utility main menu.

3. Select **Start Options** and press Enter. Make sure that **Planar Ethernet PXE/DHCP** is set to **Enabled**. Select **Startup Sequence Options** and press Enter; then, set the PCI LAN: Planar device as the first startup device.

4. Press Esc twice to exit.

5. Select **Save Settings** in the Configuration/Setup Utility main menu and press Enter to save your changes.

Configuring the Broadcom NetXtreme Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. It provides an interface for connecting to a 10 Mbps, 100 Mbps, or 1 Gbps network and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet port in the server supports auto-negotiation, the controller detects the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode.

You do not have to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. For device drivers and information about configuring the Ethernet controller, see the *Broadcom NetXtreme Gigabit Ethernet Software* CD that comes with the server. To find updated information about configuring the controller, complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.

2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.

3. Select **Servers and Storage** from the **Brand** list.

4. From **Family** list, select **ThinkServer TS100**, and click **Continue**.

5. Click **User's guides and manuals** for documentation.

LSI Configuration Utility program

Use the LSI Configuration Utility program to configure and manage redundant array of independent disks (RAID) arrays. Be sure to use these programs as described in this document.

- Use the LSI Configuration Utility program to:
  - Perform a low-level format on a SAS hard disk drive
  - Create an array of SAS hard disk drives with or without a hot-spare drive
  - Set SAS protocol parameters on SAS hard disk drives

The integrated SAS/SATA controller with RAID capabilities supports RAID arrays. You can use the LSI Configuration Utility program to configure RAID 1 (IM), RAID 1E (IME), and RAID 0 (IS) for a single pair of attached devices. If you install a different type of RAID adapter, follow the instructions in the documentation that comes with the adapter to view or change SAS settings for attached devices.

In addition, you can download an LSI command-line configuration program from http://www.lenovo.com/support.

Consider the following information when you are using the LSI Configuration Utility program to configure and manage arrays:

- The integrated SAS/SATA controller with RAID capabilities supports the following features:
  - Integrated Mirroring (IM) with hot-spare support (also known as RAID 1)

    Use this option to create an integrated array of two disks plus up to two optional hot spare. All data on the primary disk can be migrated.
  - Integrated Mirroring Enhanced (IME) with hot-spare support (also known as RAID 1E)

    Use this option to create an integrated mirror enhanced array of three to eight disks, including up to two optional hot spare. All data on the array disks will be deleted.
  - Integrated Striping (IS) (also known as RAID 0)

    Use this option to create an integrated striping array of two to eight disks. All data on the array disk will be deleted.
- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.
- If you use an integrated SAS/SATA controller with RAID capabilities to configure a RAID 1 (mirrored) array after you have installed the operating system, you will lose access to any data or applications that were previously stored on the secondary drive of the mirrored pair.
- If you install a different type of RAID controller, see the documentation that comes with the controller for information about viewing and changing SAS settings for attached devices.

To start the LSI Configuration Utility program, complete the following steps:

1. Turn on the server.
2. When the message `<<< Press <CTRL-C> to start LSI Configuration Utility >>>` is displayed, press Ctrl-C. If an administrator password has been set, you are prompted to type the password.
3. Use the arrow keys to select a controller (channel) from the list of adapters; then, press Enter.
4. To change the settings of the selected items, follow the instructions on the screen. If you select **Raid Properties**, **SAS Topology**, or **Advanced Adapter Properties**, additional screens are displayed.

When you have finished changing settings, press Esc to exit from the program; select **Save** to save the settings that you have changed.

See the *User Guide* on the *ThinkServer Documentation* DVD for more information about the LSI Configuration Utility program.

Chapter 5. Solving problems

This chapter provides basic troubleshooting information to help you solve some common problems that might occur while you are setting up the server.

If you cannot locate and correct a problem by using the information in this chapter, see Appendix A, "Getting help and technical assistance," on page 77, the *Hardware Maintenance Manual*.

Diagnostic tools overview

The following tools are available to help you diagnose and solve hardware-related problems:

- **POST beep codes**

  The power-on self-test beep codes indicate the detection of a problem.

  – One beep indicates successful completion of POST, with no errors.

  – More than one beep indicates that POST detected a problem. Error messages are displayed also if POST detects a hardware-configuration problem.

    See "POST beep codes" and the *Hardware Maintenance Manual* for more information.

- **Troubleshooting tables**

  These tables list problem symptoms and actions to correct the problems. See "Troubleshooting tables" on page 62 for more information.

- *Diagnostics* **DVD**

  The *Diagnostics* DVD provided with your server contains the diagnostic programs for testing the major components of the server. For additional information about the *Diagnostics* DVD, see the *Hardware Maintenance Manual*.

- **System-board error LEDs**

  An LED on the system board might be lit to help isolate an error that is indicated by the system-error LED on the front of the server. See "System-board LEDs" on page 75 for more information.

POST beep codes

POST emits one beep to signal successful completed. If POST detects a problem during startup, other beep codes might occur. Use the following beep code descriptions to help diagnose and solve problems that are detected during startup.

Note: See the *Hardware Maintenance Manual* for more information about the POST beep codes.

One beep
> POST was completed successfully without detecting any errors.

Repeating long beeps
> A memory error has occurred. Make sure that all DIMMs are correctly installed.

Other beep codes
> See the *Hardware Maintenance Manual* for information about other beep codes.

POST error codes

The following table provides an abbreviated list of the error codes that might appear during POST. See the *Hardware Maintenance Manual* for more information about the POST error codes. To check for updated technical information, complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. Select **Servers and Storage** from the **Brand** list.
4. From **Family** list, select **ThinkServer TS100**, and click **Continue**.
5. Click **User's guides and manuals** for documentation.

Table 11. Abbreviated list of POST error codes

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
062	Three consecutive boot failures using the default configuration.	1. Update the system firmware to the latest level (see the *Hardware Maintenance Manual*. 2. (Trained service technician only) Replace the system board.
101	Tick timer internal interrupt failure.	(Trained service technician only) Replace the system board.
102	Internal timer channel 2 test failure.	(Trained service technician only) Replace the system board.
106	Diskette controller error.	1. Make sure that the Configuration/Setup Utility program correctly reflects the diskette drive information. 2. Reseat the diskette drive cable. 3. Reseat the diskette drive. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Diskette drive cable b. Diskette drive c. (Trained service technician only) System board

Table 11. Abbreviated list of POST error codes (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Error code	Description	Action
151	Real-time clock error.	1. Reseat the battery. 2. Replace the following components one at a time, in the order shown, restarting the server each time: a. Battery b. (Trained service technician only) System board
162	Invalid configuration information or CMOS random-access memory (RAM) checksum failure.	1. Run the Configuration/Setup Utility program, select **Load Default Settings**, and save the settings. 2. Reseat the following components: a. Battery b. Failing device (if the device is a FRU, the device must be reseated by a trained service technician only) 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Battery b. Failing device (if the device is a FRU, the device must be replaced by a trained service technician only) c. (Trained service technician only) System board
163	Time of day not set.	1. Run the Configuration/Setup Utility program, select **Load Default Settings**, make sure that the date and time are correct, and save the settings. 2. Reseat the battery. 3. Clear CMOS. See the *Hardware Maintenance Manual* for information about how to clear CMOS. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Battery b. (Trained service technician only) System board

Table 11. Abbreviated list of POST error codes (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Error code	Description	Action

164	Memory size has changed.	1. Run the Configuration/Setup Utility program, select **Load Default Settings**.
		2. Reseat the DIMM.
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. DIMM
		  b. (Trained service technician only) System board

175	Service processor flash code damaged or not loaded. **Note:** In this case, the service processor is the optional Remote Supervisor Adapter II SlimLine.	1. Update the Remote Supervisor Adapter II SlimLine firmware (see the instructions that are included with the adapter). 2. Replace the Remote Supervisor Adapter II SlimLine.
178	Security hardware error.	1. Run the Configuration/Setup Utility program, select **Load Default Settings**, and save the settings. 2. (Trained service technician only) Replace the system board.

184	Power-on password damaged.	1. Run the Configuration/Setup Utility program, select **Load Default Settings**, and save the settings.
		2. Reseat the battery.
		3. Clear CMOS. See the *Hardware Maintenance Manual* for information about how to clear CMOS.
		4. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Battery
		  b. (Trained service technician only) System board

187	VPD serial number not set.	1. Set the serial number by updating the BIOS code level (see "Updating the firmware" in the *Hardware Maintenance Manual*. 2. (Trained service technician only) Replace the system board.

Table 11. Abbreviated list of POST error codes (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Error code	Description	Action
188	Service processor firmware corrupted or not installed.	1. Restart the server. 2. Run the Configuration/Setup Utility program, select **Load Default Settings**, and save the settings. 3. Update the Remote Supervisor Adapter II SlimLine firmware (see the instructions that are included with the adapter). 4. (Trained service technician only) Replace the system board.
189	Three attempts were made to access the server with an incorrect password.	Restart the server and enter the administrator password; then, run the Configuration/Setup Utility program and change the power-on password.
289	A DIMM has been disabled by the system.	1. Make sure that the DIMM is installed correctly (see "Installing a memory module" on page 13). 2. Replace the DIMM. 3. (Trained service technician only) Replace the system board.
602	Invalid diskette boot record	1. Replace the diskette. 2. Reseat the diskette drive cables. 3. Replace the diskette drive.
604	Internal diskette drive error	1. Run the Configuration/Setup Utility program, select **Load Default Settings**, and save the settings. 2. Reseat the diskette drive signal cables. 3. Replace the diskette drive.
962	Parallel port configuration error	1. Run the Configuration/Setup Utility program and make sure that the parallel port setting is correct. 2. (Trained service technician only) Replace the system board.
1162	Serial port error	1. Run the Configuration/Setup Utility program and make sure that the serial port settings are correct. 2. (Trained service technician only) Replace the system board.
1600	The service processor is not functioning.	(Trained service technician only) Replace the system board.

Table 11. Abbreviated list of POST error codes (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Error code	Description	Action
1601	System-management adapter communication error.	1. Update the BMC firmware (see "Updating the Firmware" in the *Hardware Maintenance Manual*). 2. (Trained service technician only) Replace the system board.

1603	System-management adapter communication error.	1. Make sure that the Remote Supervisor Adapter II SlimLine is installed correctly.
		 2. Update the Remote Supervisor Adapter II SlimLine firmware (see "Updating the firmware" in the *Hardware Maintenance Manual*).
		 3. Reseat the following components:
		  a. Adapter
		  b. (Trained service technician only) System board
		 4. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Remote Supervisor Adapter II SlimLine
		  b. (Trained service technician only) Replace the system board.

1762	Hard disk drive configuration error.	1. Run the Configuration/Setup Utility program and load the default settings.
		 2. Reseat the following components:
		  a. Hard disk drive cables
		  b. Hard disk drive
		  c. (Trained service technician only) System board
		 3. Replace the following components one at a time, in the order shown, restarting the server each time.
		  a. Hard disk drive cables
		  b. Hard disk drive
		  c. (Trained service technician only) System board

Table 11. Abbreviated list of POST error codes (continued)

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

178*x*	Fixed disk error.
	Note: *x* is the drive that has the error.
		1. Run the hard disk drive diagnostic tests on drive *x* (see "Running the diagnostic programs" in the *Hardware Maintenance Manual*).
		
		2. Reseat the following components, depending on the server model:
		  • Hot-swap models: Hard disk drive
		  • Simple-swap models:
		    a. Hard disk drive *x*
		    b. Hard disk drive *x* cable
		
		3. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time:
		  • Hot-swap models:
		    a. Hard disk drive *x*
		    b. Hard disk drive backplane
		  • Simple-swap models:
		    a. Hard disk drive *x*
		    b. Hard disk drive *x* cable
		
		4. (Trained service technician only) Replace the system board.

1800	Unavailable PCI hardware interrupt.	1. Run the Configuration/Setup Utility program and adjust the adapter settings. 2. Remove each adapter one at a time, restarting the server each time, until the failing adapter is isolated.

Table 11. Abbreviated list of POST error codes (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Error code	Description	Action
1801	A PCI or PCI Express adapter has requested memory resources that are not available.	1. Make sure that no devices have been disabled in the Configuration/Setup Utility program. 2. Change the order of the adapters in the PCI and PCI Express slots. Make sure that the startup (boot) device is positioned early in the scanning order. (For information about the scanning order, see the *User Guide* on the *ThinkServer Documentation* DVD). 3. Make sure that the settings for the adapter and all other adapters in the Configuration/Setup Utility program are correct. If the memory resource settings are not correct, change them. 4. If all memory resources are being used, remove an adapter to make memory available to the adapter. Disabling the BIOS on the adapter should correct the error. See the documentation that comes with the adapter.

1802	No more I/O space is available for a PCI or PCI Express adapter.	1. If the error code indicates a particular PCI or PCI Express slot or device, remove that device.
		2. Reseat each adapter.
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Failing PCI or PCI Express adapter
		  b. (Trained service technician only) System board

1803	No more memory (above 1 MB for a PCI or PCI Express adapter).	1. If the error code indicates a particular PCI or PCI Express slot or device, remove that device.
		2. Reseat each adapter.
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Failing PCI or PCI Express adapter
		  b. (Trained service technician only) System board

Table 11. Abbreviated list of POST error codes (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Error code	Description	Action

1804	No more memory (below 1 MB for a PCI or PCI Express adapter).	1. Remove the failing adapter.
		2. Reseat each adapter.
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Failing PCI or PCI Express adapter
		  b. (Trained service technician only) System board

1805	PCI option ROM checksum error.	1. Remove the failing adapter.
		2. Reseat each adapter.
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Failing PCI or PCI Express adapter
		  b. (Trained service technician only) System board

1806	PCI or PCI Express built in self-test failure.	1. If the error code indicates a particular PCI or PCI Express slot or device, remove that device.
		2. Reseat the following components:
		  a. Each adapter
		  b. (Trained service technician only, if the specified board is a FRU) The board that is indicated in the error code
		3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.

1807	General PCI error.	1. Make sure that no devices have been disabled in the Configuration/Setup Utility program. 2. Replace each adapter one at a time, restarting the server each time.

Table 11. Abbreviated list of POST error codes (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Error code	Description	Action

1962	A drive does not contain a valid boot sector.	1. Make sure that a bootable operating system is installed.
		
		2. Run the hard disk drive diagnostic tests (see "Running the diagnostic programs" in the *Hardware Maintenance Manual*).
		
		3. Reseat the following components, depending on the server model:
		   • Hot-swap models:
		     a. Hard disk drive
		     b. SAS/SATA controller
		   • Simple-swap models:
		     a. Hard disk drive
		     b. Hard disk drive cable
		
		4. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time:
		   • Hot-swap models:
		     a. Hard disk drive
		     b. Hard disk drive backplane
		     c. SAS/SATA controller
		   • Simple-swap models:
		     a. Hard disk drive
		     b. Hard disk drive cable
		
		5. (Trained service technician only) Replace the system board.

2462	Video memory configuration error.	1. Reseat the following components:
		   a. Video adapter (if one is installed)
		   b. (Trained service technician only) System board
		
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		   a. Video adapter (if one is installed)
		   b. (Trained service technician only) System board

3001	SMART monitoring failure predicted on hard disk drive	Replace the hard disk drive.
3003	SMART command execution failure on hard disk drive	Replace the hard disk drive.
3005	Current hard disk drive configuration do not support SMART function	Replace the hard disk drive.

Table 11. Abbreviated list of POST error codes (continued)

•	**Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
•	**See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
•	**If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

5962	DVD drive configuration error.	1. Run the Configuration/Setup Utility program and load the default settings (see "Using the Configuration/Setup Utility program" on page 47).
		 2. Reseat the following components:
		    a. DVD drive cable
		    b. DVD drive
		    c. System board
		 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.

00012000	Processor machine check error.	1. (Trained service technician only) Reseat the microprocessor.
		 2. Replace the following components one at a time, in the order shown, restarting the server each time:
		    a. (Trained service technician only) Microprocessor
		    b. (Trained service technician only) System board

00019701	Microprocessor failed the built in self-test (BIST).	1. (Trained service technician only) Reseat the microprocessor.
		 2. Replace the following components one at a time, in the order shown, restarting the server each time:
		    a. (Trained service technician only) Microprocessor
		    b. (Trained service technician only) System board

01298001	No update data for microprocessor.	1. Update the BIOS code again (see the *Hardware Maintenance Manual*). 2. (Trained service technician only) Reseat the microprocessor. 3. (Trained service technician only) Replace the microprocessor.
01298101	Bad update data for processor.	1. Update the BIOS code again (see the *Hardware Maintenance Manual*). 2. (Trained service technician only) Reseat the microprocessor. 3. (Trained service technician only) Replace the microprocessor.

Table 11. Abbreviated list of POST error codes (continued)

Error code	Description	Action
• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.		
• See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).		
• If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.		

I9990301	Hard disk drive boot sector error.	1. Reseat the following components, depending on the server model:
		  • Hot-swap models:
		    a. Hard disk drive
		    b. SAS/SATA controller
		  • Simple-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		2. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time:
		  • Hot-swap models:
		    a. Hard disk drive
		    b. Hard disk drive backplane
		    c. SAS/SATA controller
		  • Simple-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		3. (Trained service technician only) Replace the system board.

I9990650	AC power has been restored.	1. Reseat the power cords. 2. Check for interruption of the external power. 3. Replace the power cords.

Troubleshooting tables

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms. See the *Hardware Maintenance Manual* for more detailed troubleshooting information. If you cannot find a problem in these tables, run the diagnostic programs (see "Running the diagnostic programs" in the *Hardware Maintenance Manual*).

If you have just added new software or a new optional device and the server is not working, complete the following steps before you use the troubleshooting tables:

1. Check the system-board LEDs or the LEDs on the front panel (see "System-board LEDs" on page 75).
2. Remove the software or device that you just added.
3. Run the diagnostic tests to determine whether the server is running correctly.

4. Reinstall the new software or new device.

CD or DVD drive problems

•	**Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
•	**See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
•	**If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

The CD or DVD drive is not recognized.	1. Make sure that:
	  • The SATA channel to which the CD or DVD drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program.
	  • All cables and jumpers are installed correctly.
	  • The correct device driver is installed for the CD or DVD drive.
	2. Run the CD or DVD drive diagnostic programs.
	3. Reseat the CD or DVD drive cable.
	4. Replace the following components one at a time, in the order shown, restarting the server each time:
	  a. CD or DVD drive cable
	  b. CD or DVD drive
	  c. (Trained service technician only) System board
	5. Replace the components listed in step 4 one at a time, in the order shown, restarting the server each time.

A CD or DVD is not working correctly.	1. Clean the CD or DVD.
	2. Run the CD or DVD drive diagnostic programs.
	3. Reseat the CD or DVD drive cable.
	4. Replace the following components one at a time, in the order shown, restarting the server each time:
	  a. CD or DVD drive cable
	  b. CD or DVD drive

The CD or DVD drive tray is not working.	1. Make sure that the server is turned on.
	2. Insert the end of a straightened paper clip into the manual tray-release opening.
	3. Reseat the CD or DVD drive cable.
	4. Replace the following components one at a time, in the order shown, restarting the server each time:
	  a. CD or DVD drive cable
	  b. CD or DVD drive

Diskette drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

The diskette drive activity LED stays lit, or the server bypasses the diskette drive.	• If there is a diskette in the drive, make sure that:
	  – The diskette drive cables are correctly and securely connected.
	  – The diskette drive is enabled in the Configuration/Setup Utility program.
	  – The diskette is good and not damaged. (Try another diskette if you have one.)
	  – The diskette is inserted correctly in the drive.
	  – The diskette contains the necessary files to start the server.
	  – Your software program is working properly.
	• To prevent diskette drive read/write errors, make sure that the distance between monitors and diskette drives is at least 76 mm (3 in.).
	• Replace the diskette drive.

General problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A cover lock is broken, an LED is not working, or a similar problem has occurred.	If the part is a CRU, replace it. If the part is a FRU, the part must be replaced by a trained service technician.

Hard disk drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
Not all drives are recognized by the hard disk drive diagnostic test (the Fixed Disk Test or the SCSI Attached Disk test).	Remove the drive that is indicated by the diagnostic tests; then, run the hard disk drive diagnostic test again. If the remaining drives are recognized, replace the drive that you removed with a new one.
The server stops responding during the hard disk drive diagnostic test.	Remove the hard disk drive that was being tested when the server stopped responding, and run the diagnostic test again. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A hard disk drive was not detected while the operating system was being started.	Reseat all hard disk drives and cables; then, run the hard disk drive diagnostic tests again.
A hard disk drive passes the diagnostic DiskDriveDiagnosticTest but the problem remains.	Run the diagnostic DiskDriveDiagnosticTest (see "Running the diagnostic programs" in the *Hardware Maintenance Manual*).

Intermittent problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A problem occurs only occasionally and is difficult to diagnose.	1. Make sure that: • All cables and cords are connected securely to the rear of the server and attached devices. • When the server is turned on, air is flowing from the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down. 2. Check the system event/error log (see "Error logs" in the *Hardware Maintenance Manual*).

Keyboard, mouse, or pointing-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

All or some keys on the keyboard do not work.	1. Make sure that:
	  • The keyboard is compatible with the server. See http://www.lenovo.com/accessories.
	  • The keyboard cable is securely connected.
	  • The server and the monitor are turned on.
	2. If you are using a USB keyboard, run the Configuration/Setup Utility program and enable keyboardless operation to prevent a POST error message from being displayed during startup.
	3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the USB keyboard from the hub and connect it directly to the server.
	4. Replace the following components one at a time, in the order shown, restarting the server each time:
	  a. Keyboard
	  b. (Trained service technician only) System board

The mouse or pointing device does not work.	1. Make sure that:
	  • The mouse is compatible with the server. See http://www.lenovo.com/accessories.
	  • The mouse or pointing-device cable is securely connected to the server.
	  • The mouse or pointing-device drivers are installed correctly.
	  • The server and the monitor are turned on.
	  • The mouse option is enabled in the Configuration/Setup Utility program.
	2. If you are using a USB mouse or pointing device and it is connected to a USB hub, disconnect the mouse or pointing device from the hub and connect it directly to the server.
	3. Replace the following components one at a time, in the order shown, restarting the server each time:
	  a. Mouse or pointing device
	  b. (Trained service technician only) System board

Memory problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The amount of system memory that is displayed is less than the amount of installed physical memory.	1. Make sure that: • No error LEDs are lit on the front-panel assembly or on the system board. • The memory modules are seated correctly. • You have installed the correct type of memory. • If you changed the memory, you updated the memory configuration in the Configuration/Setup Utility program. • All DIMMs are enabled. The server might have automatically disabled a DIMM when it detected a problem. • If a DIMM was disabled by a system-management interrupt (SMI), replace the DIMM. 2. Check the POST error log for error message 289. If POST error message 289 is in the error log, perform the actions listed in the POST error codes table (see "POST error codes" on page 52). Otherwise, continue to step 3. 3. Run memory diagnostics (see "Running the diagnostic programs" in the *Hardware Maintenance Manual*). 4. Make sure that there is no memory mismatch when the server is over the minimum memory configuration (one 1-GB DIMM) and that you have installed the correct number of DIMMs (see the *User Guide* on the *ThinkServer Documentation* DVD for information about the supported DIMM configurations). 5. Reseat the DIMMs. 6. Replace the following components one at a time, in the order shown, restarting the server each time: a. DIMMs b. (Trained service technician only) System board

Microprocessor problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

The server emits a continuous beep during POST, indicating that the startup (boot) microprocessor is not working correctly.	1. Make sure that the microprocessor is supported on this server.
	2. (Trained service technician only) Make sure that the microprocessor is seated correctly.
	3. Replace the following components one at a time, in the order shown, restarting the server each time:
	   a. (Trained service technician only) Microprocessor
	   b. (Trained service technician only) System board

Monitor problems

Some Lenovo monitors have their own self-tests. If you suspect a problem with your monitor, see the information that comes with the monitor for instructions for testing and adjusting the monitor.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
Testing the monitor	1. Make sure that the monitor cables are firmly connected. 2. Try using a different monitor on the server, or try using the monitor that is being tested on a different server. 3. Run the diagnostic programs. If the monitor passes the diagnostic programs, the problem might be a video device driver. 4. Reseat the Remote Supervisor Adapter II SlimLine (if one is installed). 5. Replace the Remote Supervisor Adapter II SlimLine (if one is installed). 6. (Trained service technician only) Replace the system board.

The screen is blank.	1. Make sure that:
	  • The server is turned on. If there is no power to the server, see "Power problems" on page 71.
	  • The monitor cables are connected correctly.
	  • The monitor is turned on and the brightness and contrast controls are adjusted correctly.
	  • A single beep sounds when the server is turned on, indicating the successful completion of POST..
	2. Make sure that the correct server is controlling the monitor, if applicable.
	3. Make sure that damaged BIOS code is not affecting the video; see "Recovering from a BIOS update failure" in the *Hardware Maintenance Manual* .
	4. See "Solving undetermined problems" in the *Hardware Maintenance Manual*.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	1. Make sure that:
	
	   • The application program is not setting a display mode that is higher than the capability of the monitor.
	
	   • You installed the necessary device drivers for the application.
	
	2. Run video diagnostics (see "Running the diagnostic programs" in the *Hardware Maintenance Manual*).
	
	   • If the server passes the video diagnostics, the video is good; see "Solving undetermined problems" in the *Hardware Maintenance Manual*.
	
	   • (Trained service technician only) If the server fails the video diagnostics, replace the system board.

The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor.
	
	   Attention: Moving a color monitor while it is turned on might cause screen discoloration.
	
	   Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.
	
	   Notes:
	
	   a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).
	
	   b. Non-Lenovo monitor cables might cause unpredictable problems.
	
	2. Reseat the monitor cable.
	
	3. Reseat the Remote Supervisor Adapter II SlimLine
	
	4. Replace the following components one at a time, in the order shown, restarting the server each time:
	
	   a. Monitor
	
	   b. Remote Supervisor Adapter II SlimLine
	
	   c. (Trained service technician only) System board

Wrong characters appear on the screen.	1. If the wrong language is displayed, update the BIOS code with the correct language (see "Updating the firmware" in the *Hardware Maintenance Manual*).
	
	2. Reseat the monitor cable.
	
	3. Replace the following components one at a time, in the order shown, restarting the server each time:
	
	   a. Monitor
	
	   b. (Trained service technician only) System board

Optional-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
An Lenovo optional device that was just installed does not work.	1. Make sure that: • The device is designed for the server (see http://www.lenovo.com/ accessories). • You followed the installation instructions that came with the device and the device is installed correctly. • You have not loosened any other installed devices or cables. • You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or any other device is changed, you must update the configuration. 2. Reseat the device that you just installed. 3. Replace the device that you just installed.
An Lenovo optional device that used to work does not work now.	1. Make sure that all of the cable connections for the device are secure. 2. If the device comes with test instructions, use those instructions to test the device. 3. Reseat the failing device. 4. Replace the failing device.

Power problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

The power-control button does not work (the server does not start).
 Note: The power-control button will not function until 20 seconds after the server has been connected to ac power.
	1. Make sure that the front-panel assembly power-control button is working correctly:
	  a. Disconnect the server power cords.
	  b. Reconnect the power cords.
	  c. Press the power-control button.
	 2. Make sure that:
	  • The power cords are correctly connected to the server and to a working electrical outlet.
	  • The server contains the correct type of DIMMs.
	  • The DIMMs are correctly seated.
	  • The LEDs on the power supply do not indicate a problem.
	  • The microprocessor is correctly installed.
	 3. Reseat the following components:
	  a. DIMMs
	  b. Power supply cables to all internal components
	  c. Power supplies (hot-swap models)
	 4. Replace the following components one at a time, in the order shown, restarting the server each time:
	  a. DIMMs
	  b. Power supplies (hot-swap models)
	  c. (Trained service technician only) Power supply (non-hot swap models)
	 5. If you just installed an optional device, remove it, and restart the server. If the server now starts, you might have installed more devices than the power supply supports.
	 6. See "Power-supply LEDs" and "Solving undetermined problems" in the *Hardware Maintenance Manual*.

The server does not turn off.	1. Determine whether you are using an Advanced Configuration and Power Management (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
	  a. Press Ctrl+Alt+Delete.
	  b. Turn off the server by holding the power-control button for 5 seconds.
	  c. Restart the server.
	  d. If the server fails POST and the power-control button does not work, disconnect the ac power cord for 20 seconds; then, reconnect the ac power cord and restart the server.
	 2. (Trained service technician only) If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

The server unexpectedly shuts down, and the LEDs on the front-panel assembly are not lit.	See "Solving undetermined problems" in the *Hardware Maintenance Manual* .

Serial-device problems

For more information about the serial port, see the *Hardware Maintenance Manual*.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

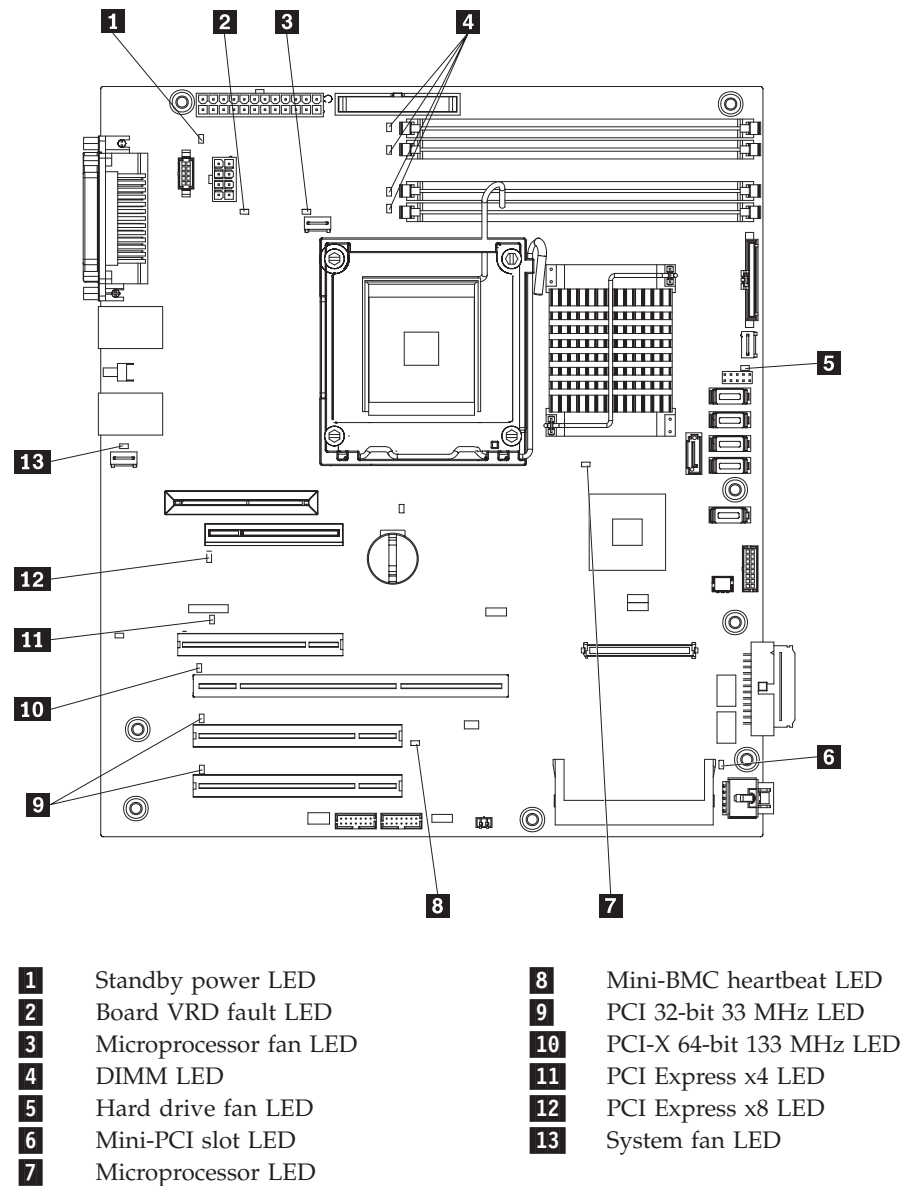| Symptom	Action
The number of serial ports that are identified by the operating system is less than the number of installed serial ports.	1. Make sure that: 　• Each port is assigned a unique address in the Configuration/Setup Utility program and none of the serial ports is disabled. 　• The serial-port adapter (if one is installed) is seated correctly. 2. Reseat the serial-port adapter. 3. Replace the serial-port adapter. 4. (Trained service technician only) System board
A serial device does not work.	1. Make sure that: 　• The device is compatible with the server. 　• The serial port is enabled and is assigned a unique address. 　• The device is connected to the correct connector. (For connector locations, see "Internal connectors, LEDs, and jumpers" in the *User Guide* on the *ThinkServer Documentation* DVD.) 2. Reseat the following components: 　a. Failing serial device 　b. Serial cable 　c. Remote Supervisor Adapter II SlimLine (if one is present) 3. Replace the following components one at a time, in the order shown, restarting the server each time: 　a. Failing serial device 　b. Serial cable 　c. Remote Supervisor Adapter II SlimLine (if one is present) 　d. (Trained service technician only) System board

EasyStartup problems

Table 12. ThinkServer EasyStartup DVD

- **Follow the suggested actions in the order in which they are listed in the Action Column until the problem is resolved.**
- **See the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU's) and which fields are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The *ThinkServer EasyStartup* DVD will not start.	• Make sure that the server supports the EasyStartup program and has a startable (bootable) CD or DVD drive. • If the startup (boot) sequence settings have been changed, make sure that the CD or DVD drive is first in the startup sequence. • If more than one CD or DVD drive is installed, make sure that only one drive is set as the primary drive. Start the CD from the primary drive.

Table 12. ThinkServer EasyStartup DVD (continued)

• **Follow the suggested actions in the order in which they are listed in the Action Column until the problem is resolved.**	
• **See the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU's) and which fields are field replacable units (FRUs).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	
Symptom	**Action**
The operating-system installation program continuously loops.	Make more space available on the hard disk.
The EasyStartup program will not start the operating-system media.	Make sure that the operating-system media is supported by the EasyStartup program.

Software problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	
Symptom	**Action**

You suspect a software problem.	1. To determine whether the problem is caused by the software, make sure that:
	    • The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software. If you have just installed an adapter or memory, the server might have a memory-address conflict.
	    • The software is designed to operate on the server.
	    • Other software works on the server.
	    • The software works on another server.
	2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
	3. Contact your place of purchase of the software.

Universal Serial Bus (USB) device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

A USB device does not work.	1. Run USB diagnostics (see "Running the diagnostic programs" in the *Hardware Maintenance Manual*).
	
	2. Make sure that:
	  • The correct USB device driver is installed.
	  • The operating system supports USB devices.
	
	3. Make sure that the USB configuration options are set correctly in the Configuration/Setup Utility program. (For more information, see the*User Guide* on the *ThinkServer Documentation* DVD.)
	
	4. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

System-board LEDs

The following illustration shows the LEDs on the system board. You might have to refer to this illustration when you are solving problems with the server.

1	Standby power LED	**8**	Mini-BMC heartbeat LED
2	Board VRD fault LED	**9**	PCI 32-bit 33 MHz LED
3	Microprocessor fan LED	**10**	PCI-X 64-bit 133 MHz LED
4	DIMM LED	**11**	PCI Express x4 LED
5	Hard drive fan LED	**12**	PCI Express x8 LED
6	Mini-PCI slot LED	**13**	System fan LED
7	Microprocessor LED		

Use the system-board LEDs to diagnose system errors. An error LED is lit to indicate a problem with a specific component. After a problem is corrected, its LED will not be lit the next time that the server is restarted; if the problem remains, the LED will be lit again. For additional information, see the *Hardware Maintenance Manual*.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you. This section contains information about where to go for additional information about Lenovo and Lenovo products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Hardware Maintenance Manual*.
- Go to the Lenovo Support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the documentation that is provided with your Lenovo product. The documentation that comes with Lenovo systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your Lenovo system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. Most of the documentation for your server is on the *ThinkServer Documentation* DVD provided with your server. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. Lenovo maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.lenovo.com/support and follow the instructions.

Getting help and information from the World Wide Web

On the World Wide Web, the Lenovo Web site has up-to-date information about Lenovo systems, optional devices, services, and support. For general information about Lenovo products or to purchase Lenovo products, go to http://www.lenovo.com. For support on Lenovo products, go to http://www.lenovo.com/support.

Calling for service

During the warranty period, you can get help and information by telephone through the Customer Support Center.

These services are available during the warranty period:

- **Problem determination -** Trained personnel are available to assist you with determining a hardware problem and deciding what action is necessary to fix the problem.
- **Hardware repair -** If the problem is caused by hardware under warranty, trained service personnel are available to provide the applicable level of service.
- **Engineering Change management -** There might be changes that are required after a product has been sold. Lenovo or your reseller will make selected Engineering Changes (ECs) available that apply to your hardware.

These items are not covered by the warranty:

- Replacement or use of parts not manufactured for or by Lenovo or non-warranted Lenovo parts
- Identification of software problem sources
- Configuration of BIOS as part of an installation or upgrade
- Changes, modifications, or upgrades to device drivers
- Installation and maintenance of network operating systems (NOS)
- Installation and maintenance of application programs

Refer to the safety and warranty information that is provided with your computer for a complete explanation of warranty terms. You must retain your proof of purchase to obtain warranty service.

For a list of service and support phone numbers for your country or region, go to http://www.lenovo.com/support and click **Support phone list** or refer to the safety and warranty information provided with your computer.

Note: Phone numbers are subject to change without notice. If the number for your country or region is not provided, contact your Lenovo reseller or Lenovo marketing representative.

If possible, be at your computer when you call. Have the following information available:

- Machine type and model
- Serial numbers of our hardware products
- Description of the problem
- Exact working of any error messages
- Hardware and software configuration information

Using other services

If you travel with a Lenovo notebook computer or relocate your computer to a country where your desktop, notebook, or server machine type is sold, your computer might be eligible for International Warranty Service, which automatically entitles you to obtain warranty service throughout the warranty period. Service will be performed by service providers authorized to perform warranty service.

Service methods and procedures vary by country, and some services might not be available in all countries. International Warranty Service is delivered through the method of service (such as depot, carry-in, or on-site service) that is provided in the servicing country. Service centers in certain countries might not be able to service all models of a particular machine type. In some countries, fees and restrictions might apply at the time of service.

To determine whether your computer is eligible for International Warranty Service and to view a list of the countries where service is available, go to http://www.lenovo.com/support, click **Warranty**, and follow the instructions on the screen.

For technical assistance with the installation of, or questions related to, Service Packs for your preinstalled Microsoft® Windows® product, refer to the Microsoft Product Support Services Web site at http://www.support.microsoft.com/directory/, or you can contact the Customer Support Center. Some fees might apply.

Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and service name might vary by country or region. For more information about these services, go to the Lenovo Web site at http://www.lenovo.com/.

Lenovo Taiwan product service

台 灣 **Lenovo** 產 品 服 務 資 訊 如 下 ：
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服務電話: **0800-000-700**

Appendix B. Notices

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from Lenovo.

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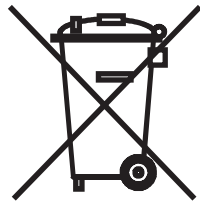
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Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'etiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers

l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

Users of electrical and electronic equipment (EEE) with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE and minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances. For additional WEEE information, go to: http://www.lenovo.com/lenovo/environment.

Recycling statements for Japan

日本のリサイクルに関して

本機器またはモニターの回収リサイクルについて

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http://www.ibm.com/jp/pc/service/recycle/pcrecycle

また、同法により、家庭で使用済みとなったパソコンのメーカー等による回収再資源化が2003 年10 月1 日よりスタートしました。詳細については、以下の URL にアクセスしてください。
http://www.ibm.com/jp/pc/service/recycle/personal

重金属を含む内部部品の廃棄処理について

本機器のプリント基板等には微量の重金属(鉛など) が使用されています。使用後は適切な処理を行うため、上記「本機器またはモニターの回収リサイクルについて」に従って廃棄してください。

リチウム電池交換後の廃棄処理について

本機器には、ボタン型のリチウム電池がシステム・ボード上に取り付けられています。この電池を交換する場合には、お買い上げいただいた販売店にお問い合わせいただくか、弊社の修理サービスをご利用ください。万一お客様が交換された場合の古い電池を廃棄する際は、ビニール・テープなどで絶縁処理をして、お買い上げいただいた販売店にお問い合わせいただくか、もしくは産業廃棄物処理業者に処理をご依頼ください。また一般家庭などから、一般廃棄物として自治体に廃棄を依頼するときは、地方自治体の条例・規則に従って廃棄してください。

Battery return program

This product may contain a lithium or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal or batteries outside the United States, go to http://www.lenovo.com/lenovo/environment or contact your local waste disposal facility.

For Taiwan: Please recycle batteries.

For the European Union:
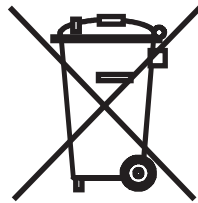
Notice: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueue dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury, and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence

of hazardous substances. For proper collection and treatment, go to
http://www.lenovo.com/lenovo/environment.

For California:

Perchlorate material - special handling may apply. See http://www.dtsc.ca.gov/
hazardouswaste/perchlorate/.

The foregoing notice is provided in accordance with California Code of
Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for
Perchlorate Materials. This product/part may include a lithium manganese dioxide
battery which contains a perchlorate substance.

German Ordinance for Work gloss statement

The product is not suitable for use with visual display work place devices
according to clause 2 of the German Ordinance for Work with Visual Display
Units.

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der
Bildschirmarbeitsverordnung geeignet.

Electronic emissions notices

The following section includes notices regarding electronic emissions.

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a
Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are
designed to provide reasonable protection against harmful interference when
the equipment is operated in a commercial environment. This equipment
generates, uses, and can radiate radio frequency energy and, if not installed
and used in accordance with the instruction manual, may cause harmful
interference to radio communications. Operation of this equipment in a
residential area is likely to cause harmful interference, in which case the user
will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to
meet FCC emission limits. Lenovo is not responsible for any radio or television
interference caused by using other than recommended cables and connectors or by
unauthorized changes or modifications to this equipment. Unauthorized changes
or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the
following two conditions: (1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that
may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-Lenovo option cards

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

German Class A compliance statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

Deutschland:

Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmittein

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln" EMVG (früher "Gesetz über die elektromagnetische Verträglichkeit von Geräten"). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse A.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Nach der EN 55022: "Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

Nach dem EMVG: "Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind." (Auszug aus dem EMVG, Paragraph 3, Abs. 4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Anmerkung: Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Handbüchern angegeben, zu installieren und zu betreiben.

Japanese Voluntary Control Council for Interference (VCCI) statement

　この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Taiwanese Class A warning statement

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

Lenovo product service information for Taiwan

台灣 Lenovo 產品服務資訊如下：
荷蘭商聯想股份有限公司台灣分公司
台北市信義區信義路五段七號十九樓之一
服務電話：0800-000-700

Chinese Class A warning statement

声　　明

此为 A 级产品，在生活环境中、
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Korean Class A warning statement

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자
또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 판매 또는
구입하였을 때에는 가정용으로 교환하시기 바랍니다.

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